TECHNOLOGY DEPT

STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

ESTABLISHED 1882

Jap Cruiser Mysteriously Disappears

WE serve the silent service. First to strike the enemy in his home waters, the officers and men of our submarine force are still taking daily toll of enemy ships.

These men of our submarine forces *know* engines. For they literally live *with* and *by* the Diesels which carry them to their enemies and bring them back.

Many of those engines are Fairbanks-Morse Diesels. We are proud of their performance record. We are glad that we can thus serve the officers and men who man the submarines of the United States Navy.

F M

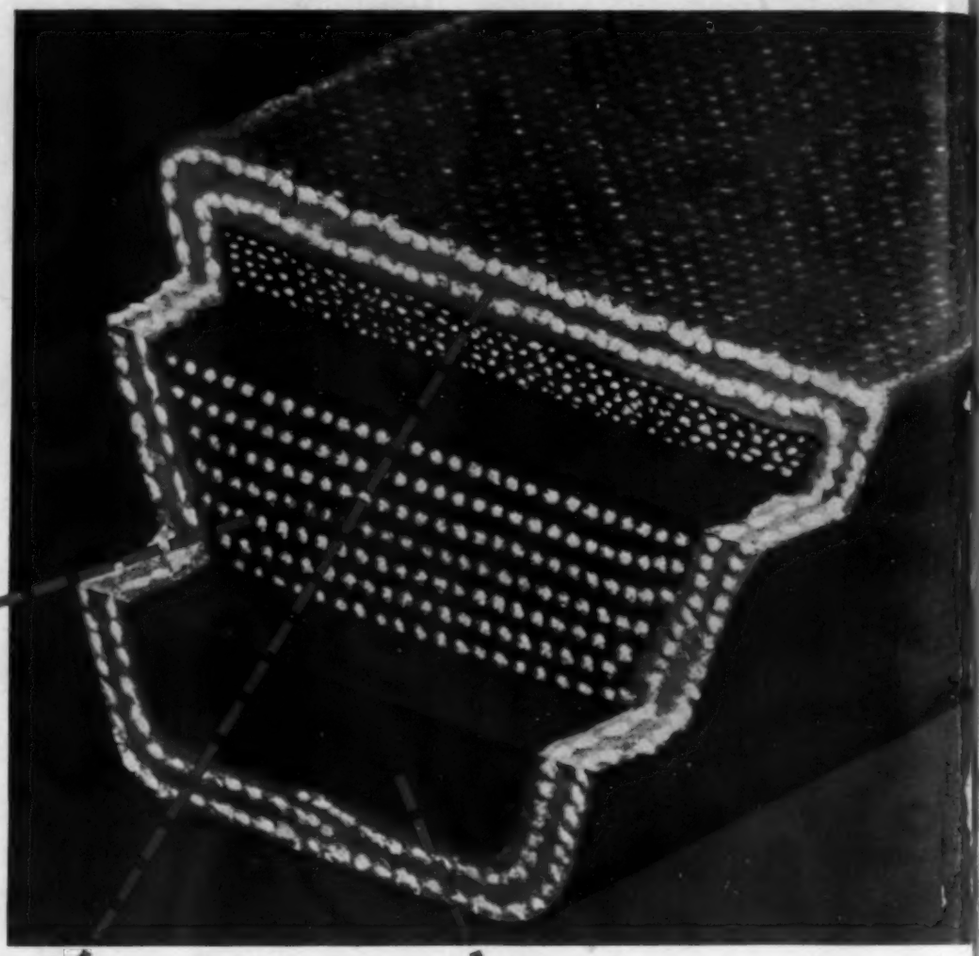
FAIRBANKS, MORSE & CO.

Anatomy of Maintenance

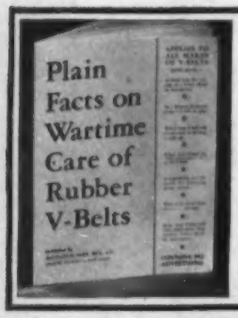
WARTIME V-BELT

You'll find this Cutaway of the new, advanced Texrope Super-7 well worth a Moment's Study... for how it's *Built* tells you a Lot about how to *Care* for V-Belts — whatever "Make" you Use! And proper Care of the rubber V-belts driving around 70% of America's production machines is a Wartime *must!*

V-Day needs every V-Belt



MUSCLE.. The 50% stronger cords and 20% *more* cords produced by the Flexon process give the new Texrope Super-7 extra muscle. To protect the pulling strength of *your* V-belts — regardless of their brand — keep them pulling *steadily*... without the slipping and grabbing that can jerk the life out of V-belts. That means keeping proper tension. Good rule-of-thumb for measuring it: "When struck with the hand, properly taut V-belts have an alive springiness."



Free!

Every engineer and executive should have a copy of this valuable new handbook in his technical library. It's packed with timely facts... applies to *all* makes of V-belts. Send for it today!

SKIN.. Texrope Super-7's tough, new Duplex-Sealed cover protects the inner belt structure against grit, grime and moisture. And what protects any V-belt's *cover* is — maintenance! So here are 3 rules for care of covers... 1. Keep grease or oil from reaching them — quickly remove it with a solvent if it does (*never* apply belt dressings to rubber V-belts!); 2. If gritty dust threatens abrasive wear, shield your V-belts; 3. Maintain proper tension to prevent slip and heating.

PAD.. Just as the bones of the human foot "ride" on the sole's pad of fat, so the pulling cords of a V-belt "ride" on a pad of rubber... which eases them around sheaves. Texrope Super-7's pad is of special, cool-running rubber which combats heat, dangerous enemy of rubber. *You* can fight heat by preventing misalignment in your drives. When present, it subjects the sides of V-belts to needless rubbing, sharply raises belt temperatures. So keep the shafts of drives parallel, sheave grooves in line.

☛ *When you do Need new V-belts, invest in the Best...Texrope Super-7!*

A 1545

ALLIS-CHALMERS

WE WORK FOR VICTORY — WE PLAN FOR PEACE

TEXROPE* SUPER-7 V-BELTS

*Trade-mark registered U. S. Patent Office. Texrope Super-7 V-Belts are the result of the cooperative research and design genius of two great companies — Allis-Chalmers and B. F. Goodrich — and are sold exclusively by Allis-Chalmers. Available in all sizes, ... ½ h.p. to 2,000 h.p.

New Motion Pictures for Users of Steel

AVAILABLE WITHOUT CHARGE FOR GOVERNMENT USE, AIRPLANE PLANTS, TANK FACTORIES, TRAINING CLASSES AND ALL MAKERS OF COMBAT MATERIALS

Bethlehem Steel Company has just completed two motion pictures designed to assist metallurgists, producers and learners in plants making war materials.

The films have been planned, photographed, and edited under the supervision of leading technical men of the company.

The purpose of the films is to facilitate the efficient handling of steel in its conversion to war-time products.

The films, while simplified as much as possible for the comprehension of the learner, are not designed primarily for entertainment or popular educational value. Hence response to requests from general groups such as luncheon clubs and similar bodies, must be deferred pending our meeting requests from war plants and training schools.

WHAT THE PICTURES SHOW

The pictures are on 16 mm. film, with sound-track, each running for about 40 minutes. The subject matter includes the following:

STEEL FOR THE ARMED FORCES
PART 1
HOW STEEL IS MADE

Blast furnace, bessemer furnace and open-hearth operations.

Animated drawings of what takes place in the blast furnace and open-hearth.

Control of slag in the open-hearth.

Spectrographic analysis.

Still cross-sections of bessemer furnace, electric furnace, and cupola furnace in the foundry.

Standard rolling operations.

Hammer forges and press forges.

Iron and steel foundry.

STEEL FOR THE ARMED FORCES
PART 2
STEEL TREATING AND TESTING

Wire drawing.

Special testing procedures.

Close-ups of inspectors at work.

Preparation of steel for re-rolling.

Animated time-temperature charts showing heat treating sequences.

Standard spark testing procedure.

Stop motion photographs of sparks held at the characteristic point to indicate presence of various alloys.

PROMPT REQUESTS SOLICITED

We shall make as many prints as necessary to supply promptly the requests from war producing and training groups. To lower our costs, any such groups are asked to apply for showings promptly so that we may estimate the number of prints which may be needed.

We also have a film library of special-product pictures such as the making of wire rope. Typical groups before which Bethlehem films have been shown in the past year:

Vought-Sikorsky Aircraft Corporation
Union Carbide and Carbon Company
Fleet Service Schools, Norfolk, Va.
San Antonio Air Depot
Springfield Armory
Watervliet Arsenal
Princeton University
Henry Ford Trade School
Purdue University
Inspectors School of Naval Material
Pennsylvania State College
University of Pennsylvania
General Motors Institute
Rensselaer Polytechnic Institute
Frankford Arsenal
Cleveland Ordnance District
University of British Columbia
Virginia Military Institute
Springfield, Ohio, Foremen's Club
Foster Wheeler Corporation
Sun Oil Company

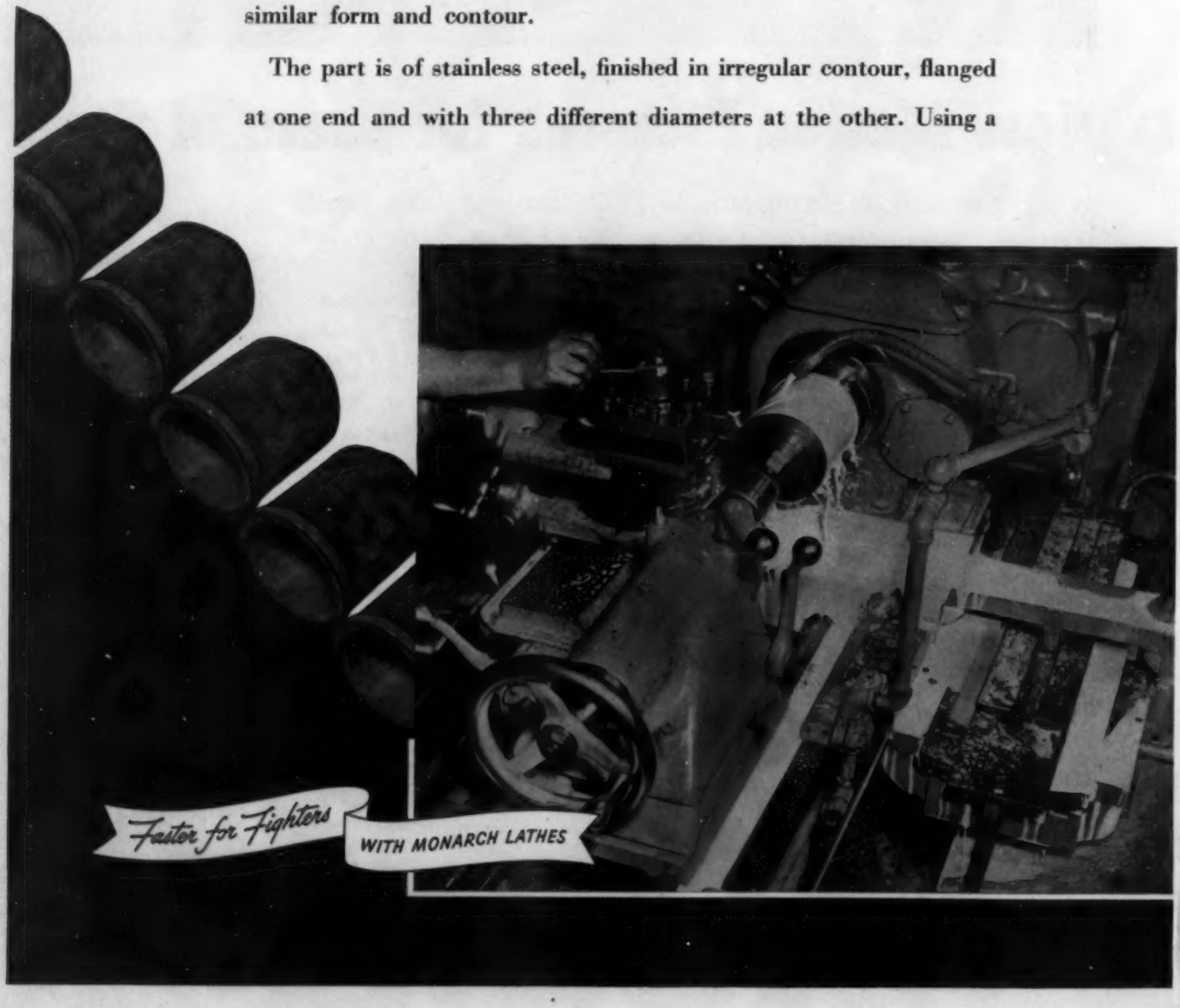
BETHLEHEM STEEL

HOW TO ORDER—*If you represent a war material plant or training group kindly write stating position, name of group, dates you desire the films and optional dates. State length of time you desire to hold prints. There are no charges except return expressage. Address Motion Picture Office, Room 841, Bethlehem Steel Company, Bethlehem, Pa.*

Keep 'em rolling faster

The method used by this producer of war equipment to finish a starter cylinder may be helpful to other manufacturers faced with the necessity for faster and more accurate production of parts of similar form and contour.

The part is of stainless steel, finished in irregular contour, flanged at one end and with three different diameters at the other. Using a



WITH MONARCH FORMING ATTACHMENT

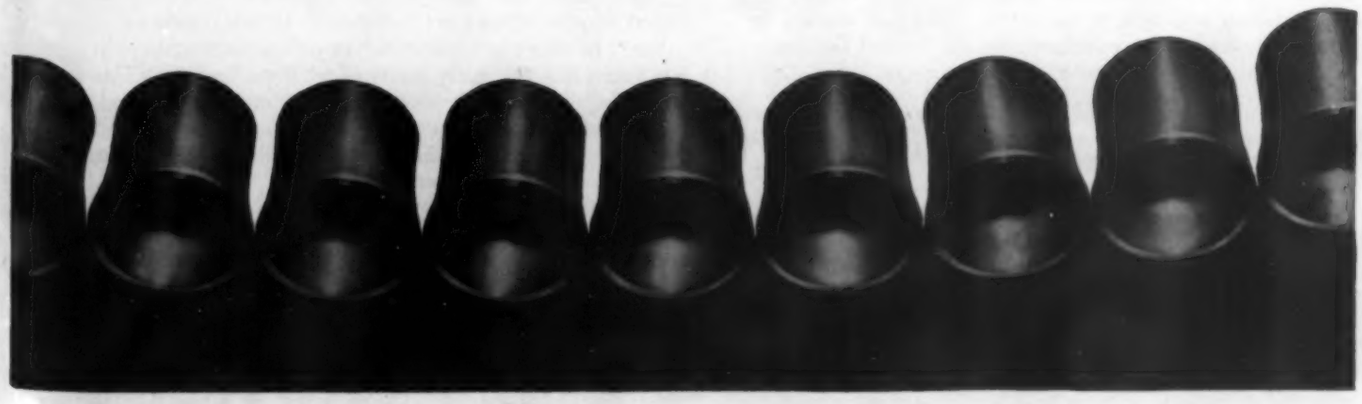
Monarch Lathe equipped with mechanical profile or forming attachment, the job is finish-turned completely in one setup. A double track cam guides the roller follower and reproduces the form on the work. Accuracy of form, providing perfect interchangeability of cylinders, is a basic requirement. This is being accomplished on a production basis with this Monarch equipment.

In war plants throughout the country, Monarch Lathes are producing with speed and accuracy literally millions of parts for our Victory program . . . are helping to deliver planes and tanks and ships and guns . . . *faster for fighters.*

THE MONARCH MACHINE TOOL COMPANY · · · SIDNEY · OHIO

MONARCH LATHES

COVER THE TURNING FIELD



BEHIND THE SCENES

Women In War Work

■ For the past several months, even before the problem of using women in war work took on the proportions it has today, the editors of STEEL have been running some of the most informative articles in the country. E. F. Reinhart, president, Republic Drill & Tool Co., Chicago, writes:

Of the several articles which have appeared during recent months in various trade papers, concerning the employment of women in our plant, yours is unquestionably the best. It is exceptionally well written and is fully descriptive of the effort we have made to successfully employ women in war production.

Yearbook Issue Assays High

■ STEEL's January 4 "Yearbook of Industry" issue has brought to our desk a very healthy pile of commending letters, commenting on every phase of the tremendous job. Of them all, however, we like the one from E. W. Weaver, Consulting Engineer, Towmotor Co., Cleveland:

In the forty years or so of perusing trade and professional publications, I have acquired some appreciation for those of high character.

I want to compliment you on the exceptional high assay of information in your January 4 issue of STEEL.

To Help Win the War

■ And inasmuch as we seem to be reading all the mail today you'll no doubt get a kick, as we did, out of this note from Karl L. Landgrebe, a few weeks ago appointed vice president of Goslin-Birmingham Manufacturing Co., Birmingham, Ala.

Thanks for mentioning my appointment in STEEL. I am very happy to stay in the "harness" for the duration and all of us old fellows who are in good health, should be doing something to help win the war as quickly as we can.

Offensive Weapons

■ Steel, oil, and other critical materials aren't the only things needed for the African campaign. We see by the paper where sixty thousand diapers were included in the American equipment landed by our invading forces. But, lest you get unduly excited they will be used as gifts for natives who'll make turbans out of them.

OPA Expert

■ Even the soda jerker must be up on his OPA regulations these days, as the following conversation overheard in a capital drugstore well proves. A girl ordered a minced ham and tomato sandwich. The s. j. started to comply, but when his customer said she wanted the sandwich to take out, he objected.

"I can serve you minced ham and tomato if you eat it here, but if you take it out you can't have the tomato. It's against OPA rules," he explained. "We raised the price of that combination sandwich recently, which is permitted by OPA so long as it's eaten on the premises. But when we sell something the customer takes with him we must adhere to the March price ceiling. How about taking plain minced ham; its price is unchanged?"

The Editors' Roundtable

Geo. W. Birdsall, Engineering Editor

■ Every once in a while an editor is invited to attend a demonstration of a new machine, process or production method. It is amazing to see the expense to which some companies go yet fail to put across their message. Others do a really effective job and at less expense due to better planning. Of course, some companies may put on such a demonstration perhaps only once in ten years and so have little experience to draw upon.

From personal observation, I would sincerely recommend the following to a company planning any sort of demonstration: First, have a single executive plan the entire program and make all arrangements.

Second, plan to have an engineer or someone thoroughly familiar with the equipment or process explain to the gathering before the demonstration just what they will see; the purpose and main advantages of the machine or process. Enough detail should be given so the visitor will have an idea of what it is all about and the principal advantages or features to observe during the demonstration. If a large gathering, use a good public address system. Keep this portion of the program short. It should not take more than a half hour.

Third, plan the actual demonstration carefully. Make it dramatic. Have plenty of action. Furnish every visitor with a printed or mimeographed copy of the program if more than a single simple operation is involved. On this program, have a time schedule for the various events and keep to it. Do not let the demonstration run longer than an hour or interest will lag. Have ample light on the demonstration. Be sure all visitors are placed to see the action clearly. Have your demonstrator use a public address system if more than a small gathering so everyone present can be sure to hear his explanation of each step as the action occurs.

Fourth, have your demonstration carefully rehearsed so it will go off smoothly. Nothing makes a poorer impression on a visitor than an obviously unrehearsed and faltering performance. Every visitor should receive the impression that these people know what they are doing and are experts at it.

Fifth, after the demonstration, provide a discussion period to give visitors an opportunity to ask questions.

Sixth, be sure every visitor leaves with something to help him remember the main points of what he has seen. This written matter may be long or short, simple or detailed, in printed booklet form or on a single mimeographed sheet—but be sure he has something that carries your message when he goes home.

These appear to be the essential elements of the most effective presentations. Following these suggestions need not involve much expense, and they are certain to improve the impression visitors will carry away with them.

Vol. 112, No. 3, January 18, 1943, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Editorial Contents—Page 17

One New Ramix Bottom..Six More Destroyers

LAST JUNE a Ramix bottom was installed in a 130-ton open hearth. It replaced an old magnesite-and-slag hearth installed in 1926.

Complete records are available on both bottoms—so it is possible to compare accurately the cost of these two types of hearths. Refiguring the magnesite-and-slag job at June 1942 material, labor and fuel rates, the use of Ramix saved this company $1,267.81 in out-of-pocket expense.

But more important to a shop engaged in war production is the time saving. The Ramix hearth took only 120 hours to build, heat up and make ready to charge the first heat, compared to 397 hours for the conventional burned-in hearth. At $60 an hour, the value of this time saving is $16,620—a total dollar saving of $17,887.81, thanks to Ramix.

More vital still, in the 277 hours of time saved, the furnace made 3,047 tons of prime steel. That's enough extra steel to build six more destroyers to help our boys win back the Solomons—or a hundred tanks to win the fight for Tunis.

Basic Service Engineers are always glad to help any steel manufacturer install Ramix hearths, make major repairs, or assist in solving any problem involving the use of basic grain refractories.

BASIC REFRACTORIES, INCORPORATED

843 HANNA BUILDING ● CLEVELAND, OHIO

Ramix is manufactured in Canada, for sale outside U. S. A. and Mexico, by Canadian Refractories Limited, Montreal

Here's Pyrometer Precision "On-the Hoof!"

Precision in a compact "package"! Foxboro Potentiometer Indicator is only 9¼" x 6⅜" x 12½" (including handle). Available in either single or double scale range.

FOXBORO PORTABLE POTENTIOMETER INDICATOR TOPS ACCURACY OF PERMANENT EQUIPMENT!

NO matter where you need close check-ups on temperatures, you can hustle a Foxboro Portable Potentiometer Indicator into place and get reliable data immediately!

This sturdy, compact portable pyrometer weighs only 14½ lbs., yet gives all the accuracy of a top-notch permanent instrument. For checking thermocouples and service equipment . . . for experimental temperature testing or as a spare in case of accidents to regular instruments . . . it's practically an essential in any plant using pyrometric instruments.

Foxboro Portable Potentiometer Indicators employ the same high-fidelity measuring system as the fixed-service Foxboro Potentiometer Indicators. The accuracy of the potentiometer circuit is unaffected by the resistance of any ordinary thermocouple circuit to which it may be connected. The 17-inch-long temperature scale provides instant, accurate reading and setting. Vernier dial gives quick precision balancing.

Write for Bulletin A-305 containing full details of this and other precision Foxboro Potentiometer Indicators. **The Foxboro Company, 118 Neponset Ave., Foxboro, Mass., U. S. A.** Branch offices in principal cities of the United States and Canada.

Potentiometer Instruments by FOXBORO

Reg. U. S. Pat. Off.

VITAL CASTINGS

PRODUCED CENTRIFUGALLY by SHENANGO-PENN

Bearings • Bushings • Pump and Cylinder Liners
Rings • Propeller Shaft Sleeves • Washers

Centrifugal casting is a process that assures castings of greater strength . . . castings that deliver long trouble-free service. Sizes range from 2" diameter bearings to 26-inch by 26-foot long propeller shaft sleeves, and for contractors in war industries, our complete machining facilities are an added advantage.

Write for these bulletins today. They describe our products, alloys and facilities in complete detail.

For Marine Service Products . . . . ask for Bulletin No. 142
For General Industrial Uses . . . . ask for Bulletin No. 143

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LEWIN-MATHES ROTATING SHELL BANDS

and

SEAMLESS TUBING

of pure copper or gilding metal

Our increased capacity enables us to fill urgent needs WITHOUT DELAY.

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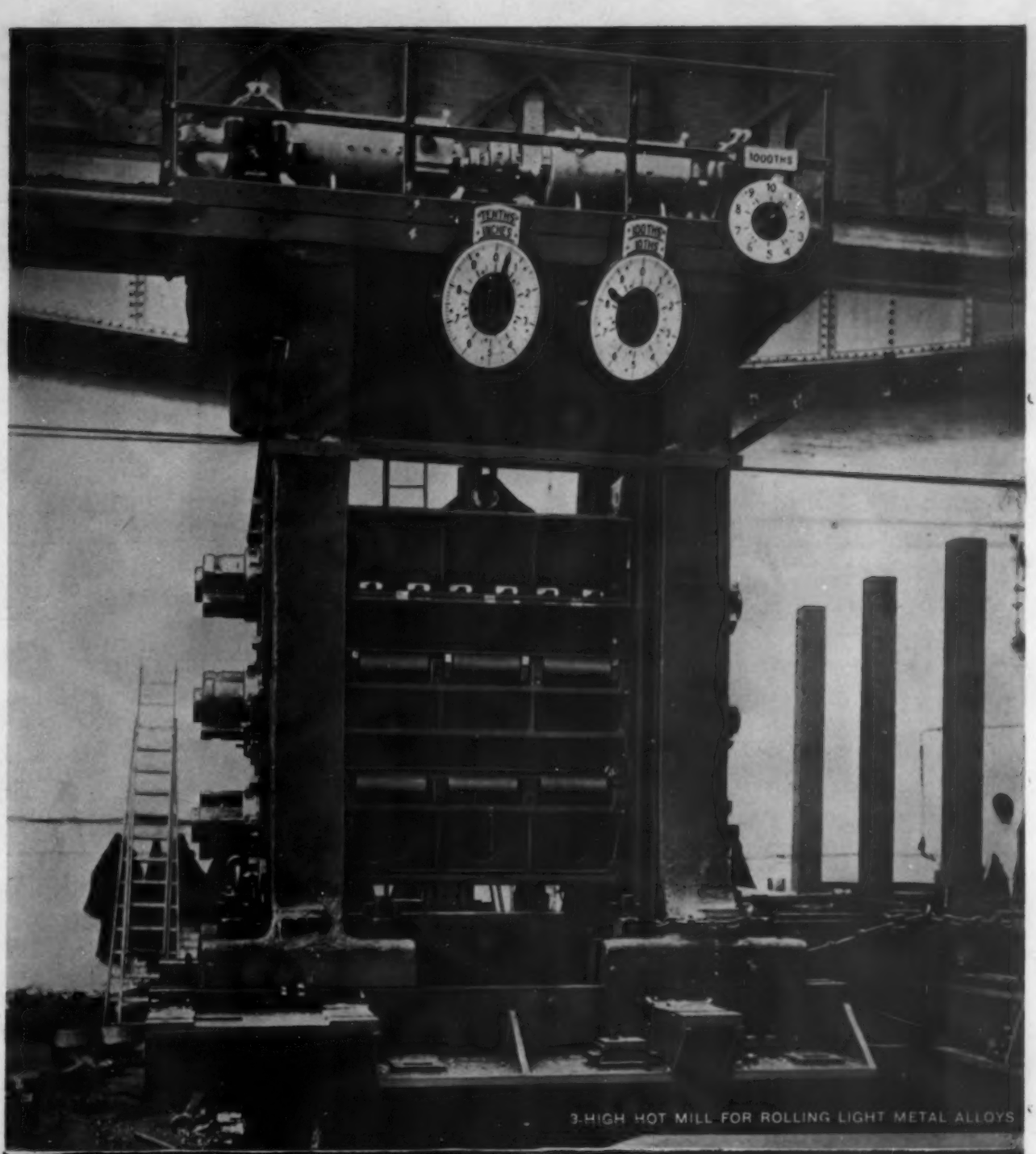

3-HIGH HOT MILL FOR ROLLING LIGHT METAL ALLOYS

HYDROPRESS · INC.

ENGINEERS CONTRACTORS

HYDRAULIC PRESSES · ROLLING MILLS
PUMPS · ACCUMULATORS

570 LEXINGTON AVENUE · NEW YORK · N. Y.

VICTORY will be won

with alloy steel

and N-A-X *9100 Series*

SAVES VITAL ALLOYING ELEMENTS

Successfully used in hundreds of exacting peace-time products and parts, N-A-X 9100 Series of Alloy Steels aids war equipment production by conserving strategic alloying elements—without impairing quality.

N-A-X 9100 Series is being used as (1) a High Tensile Grade; (2) a Medium and Deep Hardening Carburizing Grade; (3) a Medium and Deep Hardening Constructional Grade. A truly remarkable achievement of Great Lakes engineers and metallurgists, the versatile N-A-X 9100 Series is readily adaptable in the manufacture of most armament appliances, either "as rolled" or heat treated.

Basically a low-alloy steel, with vital alloying elements held to an absolute minimum, N-A-X 9100 Series is supplied in two general grades—with and without molybdenum, all other components of the analysis being held constant. With deep hardening characteristics greater than or equal to the higher alloyed steels, no sacrifice of toughness or machinability is made.

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NATIONAL STEEL

Division of
NATIONAL STEEL CORPORATION
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SCRAP IS VITAL TO STEEL PRODUCTION . . . GET YOURS IN FOR VICTORY!

be the

KNOW man

on **TESTING** in

your plant

- ☐ *Bulletin 161*—Southwark-Tate-Emery Testing Machines
- ☐ *Bulletin 162*—Stress-Strain Recording
- ☐ *Bulletin 164*—SR-4 Strain Gage
- ☐ *Bulletin 165*—SR-4 Torquemeter
- ☐ *Bulletin 169*—SR-4 Portable Strain Indicator
- ☐ *Bulletin 170*—SR-4 Strain Recorder
- ☐ *Bulletin 153*—Strain Gages and Extensometers
- ☐ *Bulletin 166*—Porter-Lipp Strain Gage
- ☐ *Bulletin 167*—Whittemore Strain Gage
- ☐ *Bulletin 134*—R. R. Moore Fatigue Testing Machine
- ☐ *Bulletin 109*—Norton Damping Capacity Testing Machine
- ☐ *Bulletin 154*—Carpenter Torsion Impact Testing Machine

...this literature will give you the facts!

Today plants are required to work with materials which they have never used before. In some cases, entirely new production facilities are being installed. Production men are faced with unfamiliar specifications. Production must be fast, and finished equipment has to be right. Time is not available for experimentation.

Are you faced with a situation like this? If you are, and if the matter of *testing* routines and the specific testing equipment to do the job are problems, you can take the first step toward solving them by sending for this helpful Baldwin Southwark literature.

Already in widespread use throughout the country, Baldwin Southwark testing machines and instruments are simple to operate, versatile in application, and offer unsurpassed sensitivity and accuracy. There is Baldwin Southwark testing equipment for your specific job of testing. Know about it now. Write for this literature today.

BLW THE BALDWIN GROUP

BALDWIN SOUTHWARK

Division THE BALDWIN LOCOMOTIVE WORKS, *Philadelphia, Pa.*

POWER
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DEADLY in its compact power—this carrier-based plane provides the sting that makes great naval air victories possible.

"A motor with wings," it has been aptly termed, for a single engine of more than 2,000 horsepower roars this mighty ship to Victory.

Engines of such tremendous horsepower are possible because of new techniques in engineering and manufacture, not the least of which have been the advances made in the Foote Bros. Gears that power them. For an engine of this size—swinging propellers at high speed offers problems in gear design and manufacture that, until a few months ago, might well have been considered unsolvable.

How well these problems were solved is evidenced by the flow of Pratt & Whitney engines rolling off production lines in huge engine plants throughout the country. The extreme precision of the gears is a tribute to the engineering back of them, but even more to the new methods of manufacture that have made their mass production possible.

When the war is won these gears, produced in the Precision Gear Plant of Foote Bros., can be applied to peacetime engines and peacetime machines. Manufacturers are then assured of a new era in the transmission of power through gears and speed reducers—an era of more compact, more efficient machines.

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Better Power Transmission Through Better Gears

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General Foundry & Mfg. Company

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The Hamilton Foundry & Machine Co.

Hamilton, Ontario, Canada
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Irvington, N. J.
Barnett Foundry & Machine Co.

Jeannette, Pa.
Elliott Company

Lewisburg, Tenn.
Marshall Stove Company

Los Angeles, Calif.
Kinney Iron Works

Milwaukee, Wis.
Koehring Company

Mt. Vernon, O., Grove City, Pa.
Cooper-Bessemer Corporation

New York, N. Y.
The American Brake Shoe & Foundry Co.

Oakland, Calif.
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Florence Pipe Foundry & Machine Co., (R. D. Wood Company, Selling Agents)

Phillipsburg, N. J.
Warren Foundry & Pipe Corp.

Pittsburgh, Pa.
Meehanite Metal Corporation

Pittsburgh, Pa.
Rossdale Foundry & Machine Co.

Rochester, N. Y.
American Laundry Machinery Co.

St. Louis, Mo.
Banner Iron Works

St. Paul, Minn.
Valley Iron Works

London, Eng.
The International Meehanite Metal Co., Ltd.

Waterloo, N. S. W.
Australian Meehanite Metal Co., Ltd.

Johannesburg, South Africa
Meehanite Metal Co. (S.A.) (Pty.) Ltd.

These QUICK FACTS about Meehanite

may help you solve today's design and production problems

WHAT IS MEEHANITE?

MEEHANITE is a special metal for castings which combines the better features of both cast iron and steel. Meehanite castings offer the engineer reliable and favorable design characteristics as described below.

TYPES

There are twenty-one types of Meehanite, each having a different combination of physical properties aimed toward meeting definite service requirements.

PHYSICAL PROPERTIES

Varying with the requirements of the service, Meehanite in its several types (as cast) produces tensile strengths up to 55,000 lb. p.s.i.; compressive strengths up to 200,000 lb. p.s.i.; moduli of rupture in bending from 61,000 to 93,000 lb. p.s.i. These and other properties such as yield point, modulus of elasticity, hardness, torsonial and shear strength, fatigue strength, etc., are known and reliable.

HEAT TREATMENT

For higher strength and hardness, Meehanite is adaptable to heat-treatment and flame hardening. Accurate information is available on these subjects, as well as on the effect of elevated temperatures (50°F. to 1100°F.) on strength, creep, surface metal loss.

MACHINABILITY

Machinability rating tests prove Meehanite more machinable than steel or alloy iron castings. This important advantage of Meehanite is due to two factors, (a) the constitution of the metal frequently permits substantially increased machining speeds, (b) dimensional accuracy and smooth cast surfaces mean less metal need be removed in finishing.

VIBRATION DAMPING

A unique combination of high damping capacity and high strength gives Meehanite castings a prominent position in the construction of precision machinery, and in highly stressed machinery parts where weight, noise and possibility of fatigue failure must be kept to the minimum.

WEAR RESISTANCE

Five types of wear-resisting Meehanite offer different combinations of physical properties to meet external problems encountered in wear-resisting service such as: hardness, impact, fatigue, friction, corrosion, lubrication, etc.

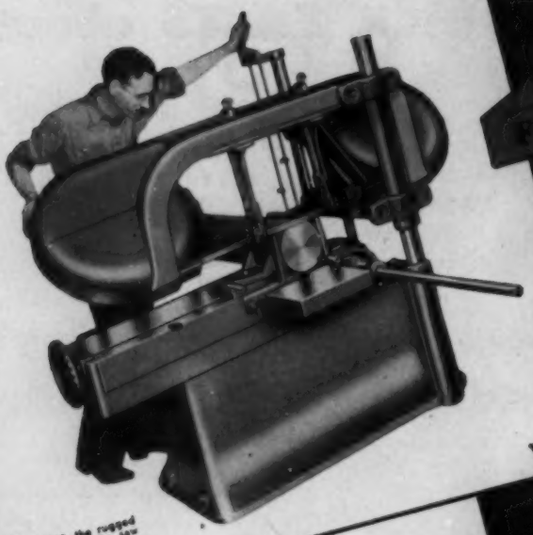
HEAT AND CORROSION RESISTANCE

Where heat and corrosion resistance combined with high strength, toughness, etc., are desired, Meehanite is available in types to resist growth, scaling, warpage, and corrosion.

ENGINEERING DATA

Complete data on engineering properties, metallurgy, heat-treatment and manufacture is included in this 47-page book. Sent free to executives, engineers, designers, production and maintenance men of industry. Price to others, $1.00 per copy.

MEEHANITE RESEARCH INSTITUTE, 311 Ross St., Pittsburgh, Pa.



V-12

Wells V-12, the rugged new heavy duty saw which features hydraulically controlled feed and lift.

FAST-ACCURATE VERSATILE

WELLS

Continuous Metal Cutting

BAND SAWS

for

PRODUCTION · TOOL ROOM
MAINTENANCE · GENERAL UTILITY

SERIES 80

Model 80 is the newly redesigned version of the popular Wells No. 8 saw.

WITH Wells Metal Cutting Band Saws you can apply the advantages of continuous cutting action to virtually all kinds of metal cutting jobs. Almost all metals in all shapes are cut quickly and accurately at minimum expense. Designed to provide maximum efficiency for saws of this type, Wells Metal Cutting Band Saws offer you these advantages:

Capacity is the greatest of any saw for the money.

Simplicity is engineered into the machine to give a lifetime of service.

Three speeds of the CORRECT amount of feet per minute assure most efficient cutting and long blade life.

Controlled feed is positive and accurate.

Heavy I beam holds and brings fully adjustable guides close up to the work for accurate cutting.

No coolant required even when cutting tool steels.

Heavy sturdy construction—no vibration.

And a host of other details that mean better metal cutting at lower cost.

Wells Has Established Leadership

WELLS MANUFACTURING CORP., THREE RIVERS, MICH.

Write for complete details

SPECIFICATIONS

SPECIFICATIONS	V-12	No. 80
Capacity: Rectangular	13"x16"	8"x16"
(Special bowed guides)		5"x24"
Rounds	13" dia.	8" dia.
Speeds: Feet per minute	33, 94, 148	60, 90, 130
Motor Size	¾ H.P.	½ H.P.
Swivel Vise	to 45°	to 45°
Blade Size	13' 7½"x.032"	11' 6"x.031"
Height to top of table	24"	25½"
Width of Bed	18"	10¼"
Drive	"V" Belt	"V" Belt
Floor Space	73"x30"	8'x6'

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The fact that ArmaSteel replaces critical steels and alloys is of no less importance than are the desirable characteristics which qualify it for important assignments in industry. ArmaSteel is a good name to keep in mind, both now and in the days of peacetime manufacturing that will follow Victory.

*Reg. U. S. Pat. Off.

SAGINAW MALLEABLE IRON DIVISION
General Motors Corporation, Saginaw, Michigan

CAST FOR A LEADING ROLE IN INDUSTRY

Manpower crisis foreseen in 1943 war production program. Page 22

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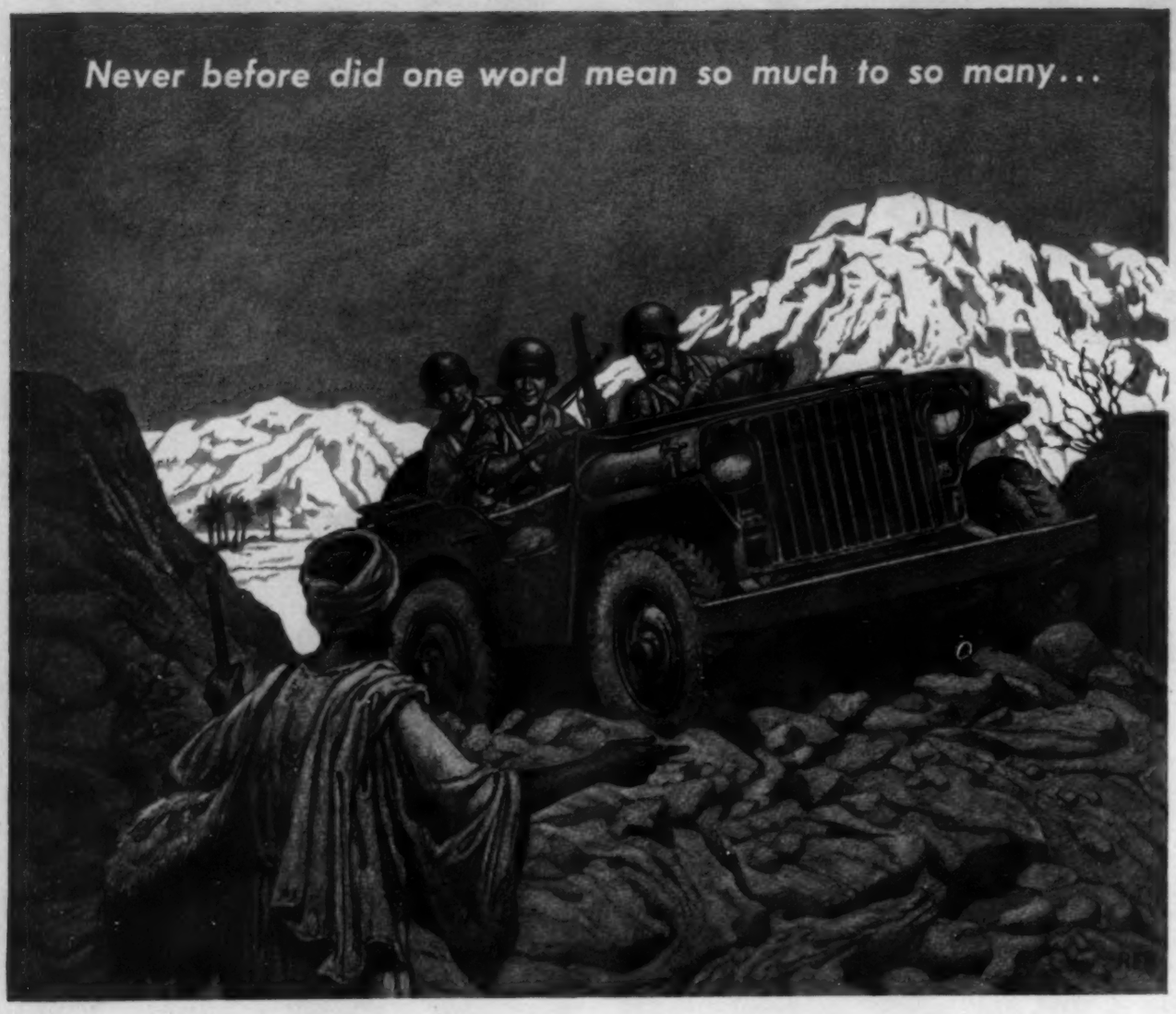

You can serve by CONSERVING

Name a continent... and you've named an American battlefront. From Tunisia to Timor, from India to Iceland, Americans and their Allies face a need for more arms and equipment... more tanks and trucks, more planes and ships and guns.

And those modern weapons need alloy steels in vital parts. Nickel steels, for example, that provide extra toughness, strength and added resistance to shock and impact. No need to tell you how essential these qualities are to the equipment of our armed forces.

That's why it's so important to *conserve* critical alloys. Every possible pound must be saved for our fighting men.

The best way to help is by making sure all metal scrap in your plant is properly segregated. Collect ferrous and non-ferrous scrap, in separate containers, at the machines where generated.

High-speed tool steels and alloyed constructional steels should also be collected and salvaged separately. When in doubt... segregate!

If metal problems are bothering you—if you would like suggestions for extending your own metal conservation program—call on our technical staff for "CONSERVICE,"—a new name for counsel and data that will help you conserve.

★ ★ **Nickel** ★ ★

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

HIGHLIGHTING

this issue of STEEL

MANPOWER Vast expansion in war production has caused the United States' most abundant resource—manpower—to become critically scarce (p. 22). It now is the year's great domestic problem, and is bringing forth various programs for job stabilization and for the recruiting of workers not normally included in the labor force. Among the new workers will be an increasing number of women, Negroes, over-age and handicapped persons. Another approach to the problem is being made (p. 25) in the prevention of sickness and its consequent absenteeism.

MATERIALS Consumption of tin in 1943 will be reduced by an additional 15,000 tons under the new General Preference Order M-43, principal savings being gained by lowering the tin content of solder from 30 to 20 per cent, (p. 36). . . Six new "claimant agencies" are being invited by WPB to nominate members to represent them on the Requirements Committee for the Controlled Materials Plan. . . Unless the railroads are given sufficient materials to permit them to maintain and renew their facilities, governmental control over the use of transportation services will be necessary, Interstate Commerce Commission has notified Congress. (p. 52).

STEEL SHELL CASES How manufacture of steel cartridge cases was accomplished is explained by Lieut. Col. H. R. Turner of the Cincinnati Ordnance Department, U. S. Army, in an article (p. 46) on deep drawing of steel for this purpose and the development of processes. Far-reaching influence on future deep-drawing practice was indicated in this outstanding paper presented at the Society of Automotive Engineers War Engineering Production meeting in Detroit last week. The sessions were unusually successful, despite the omnipresence of military censors and repeated warnings against revelation of details. Mirrors of Motordom (p. 39) presents excerpts from the leading papers.

SOUTH AMERICA Development of Argentina's rich petroleum resources to a point of maximum productivity is being undertaken by the government to offset sharply reduced imports of fuel and to provide trading stock to be used in negotiating for materials and products of neighboring Latin-American countries, (Windows of Washington, p. 32). National Mining Code safeguards the state's interests against over-exploitation of oil regions as national output climbs to 100,000,000 gallons.

IN THE NEWS Wing Tips (p. 42) describes pioneering work at Boeing Aircraft Co. to create 100,000 special tools, dies and jigs for fabrication and assembly of Flying Fortresses. These tools did not exist before mass production.

Contracts totaling $100,000,000 for tanks and gun-mounts recently received by Ford Motor Co. will make necessary the use of Chicago plants for assembly of the latter, while tanks go into production at Detroit (p. 45).

United States Pipe & Foundry Co. has acquired a substantial interest in Sloss-Sheffield Steel & Iron Co. (p. 26) to insure a more stable supply of pig iron.

TECHNICAL In Section 9 of the series on conservation and substitution, Professor Macconochie goes through the steps involved in making "reclaim" rubber from old tires and other rubber scrap (p. 56). Such reclaim rubber is finding many important applications where it conserves natural rubber by replacing it entirely or in part.

User report No. 8 on experience with the NE steels is presented by Blaine B. Westcott, who discusses their use in the oil-well drilling and equipment industries (p. 66). Some NE steels have already been adopted. Others are being selected.

G. Eldridge Stedman describes (p. 70) an unusually effective means for salvaging machine cuttings at Packard Motor Car Co., Detroit Ten metal segregations are involved in marine engine production and 13 more in aircraft engine manufacture. All 23 classifications of metal are kept separate and disposed of efficiently by the materials handling system described.

The huge new Kaiser steel plant in southern California has begun initial operation. Description of the project (p. 76) reveals that the original $59,000,000 allotted has been increased to $85,000,000. Already a 1200-ton blast furnace is in operation. With an ultimate plant capacity of 432,000 tons of pig iron, 450,000 tons of ingot, or 300,000 tons of steel plate, this development is most significant.

CONSERVE STEEL
For Our Fighting Forces

Foresighted management now is doing everything possible to conserve the steel already in service, making it last so that all new steel can go into America's war effort.

Preventing corrosive destruction is one effective way to conserve steel and help fight the war on the home front. The initial step is to critically examine all buildings and equipment—bridges, columns, trusses, floors, stairs, roofing, siding, ventilators, ducts, piping, tanks, fences, cranes, machinery, etc.—everything made of steel that is subject to corrosion from dampness, the weather or process fumes.

Paint manufacturers can offer good advice on effective methods of cleaning, and on primer and finish coats that will protect and conserve steel in and about your plant. A program to preserve steel has a valuable secondary advantage, too. Many shades of paint reflect light, and better lighting cuts spoilage, speeds production and reduces the hazards of accidents to America's war workers.

A conservation program more than pays for itself in lower maintenance and replacement costs, but more important now, every pound of steel that is saved is a boost to the war effort.

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STEEL
January 18, 1943

We Need Small Business

Ever since this nation began to mobilize for war, numerous critics have charged that too much of the production job has been entrusted to "big business."

Much of this criticism has been intelligent criticism. Most industrialists, whether identified with large corporations or small ones, realize that it is not easy to spread war production thinly among thousands of small plants. This was particularly true in the earlier stages of the war effort, when it was imperative to get started quickly.

Now that the confusion of preparation is past and the job of production is progressing in a more orderly manner, there is hope that more of the work can be assigned to the smaller companies. This would be desirable, not only because it would utilize existing facilities more effectively, but also because it is necessary—for sound economic reasons—to keep small business in existence.

Secretary Ickes recently warned that unless war orders can be distributed more widely the war may deal the final crushing blow to small business. "Should the small businessman go," he said, "we will all go."

The head of one of America's largest corporations expressed a similar view 15 years ago. In a letter to this publication he declared that the leaders of big business should remember that a healthy order of business of small and moderate size is essential to the existence of private enterprise.

This essentiality of small business is doubly pertinent now. Howard K. Smith, CBS correspondent in Switzerland, cabled PM on Jan. 3 that a few big companies in Germany have just completed "their fattest year in history, thanks to a succession of Nazi measures which have made them the most powerful, secure and exclusive little set of big businessmen anywhere in the world."

Apparently a desperate Hitler has destroyed small business in Germany. Here in America a hopeful, confident government of the people should redouble its efforts to utilize small business and thus keep private enterprise strong.

E. L. Shaner
Editor-in-Chief

Crisis Foreseen in 1943 War Production Program

Working-fighting force to total from 62,500,000 to 65,000,000 by end of year. Job stabilization planned for every industrial community. Selective service for labor may be necessary

MANPOWER—the universally strategic material for which there is no synthetic—is becoming 1943's most critical problem on the home front.

If the year's production requirements are to be met, at least 20,000,000 workers, nearly one-third of them women, will be required in war industries. Add to these about 10,000,000 for the armed services and from 32,500,000 to 35,000,000 necessary to supply essential civilian needs, drastically reduced though they may be, and the overall figure totals 62,500,000 to 65,000,000. This is approximately one-half the entire population and means that virtually every able-bodied adult must be enlisted to work or fight.

Effective utilization of a total labor force of 65,000,000, or possibly even more, can be accomplished, but it will require measures to insure, as the President recently said, that we have the "right numbers of the right people at the right places at the right time."

It will necessitate the abolition of "featherbed" practices, especially in the railroads and building trades, sharp reduction in absenteeism, discontinuance of strikes as usual and probably modification of the 40-hour week. Eventually, it may necessitate a selective service system for labor, similar to that used for the armed forces.

Handling of manpower mobilization to date has been target for harsh criticism from many quarters. A House committee, headed by Rep. John H. Tolan, California, which has been investigating the problem, expressed "general concern" over the manner in which Paul V. McNutt's job as manpower director is shaping up.

The committee declared the United States' failure to meet 1942 production goals (not an unqualified failure) reflects a maladjustment in the war production program.

"The haphazard character of our mobilization of American production is especially reflected in the field of manpower. Much of this is traceable . . . to the divided counsels and authority which this committee has repeatedly criticized, as well as the absence of an inventory of our manpower.

"There was considerable expression of gratification after the President issued his executive order No. 9279 conferring on Governor McNutt control over an expanded War Manpower Commission. During the intervening weeks this elation has ebbed, and there is general concern lest this opportunity be allowed to slip."

Mr. McNutt, on the other hand, promises that by the end of the first quarter "some form of manpower control will be in effect in every major industrial community in the United States."

All over the country today, the commission says, "workers and their employers are listening to a new term—job control, or job stabilization—and wondering how it will affect them. Some have heard it described as 'job freezing' and are apprehensive.

"Job control, or stabilization, is a new term and a new problem in a nation used to having plenty of workers.

"It is a device to enable each war

Every effort to prevent wastage of manpower is being made in war plants. Posters urging a maximum of efficiency, a minimum of absenteeism have been erected by many companies. Poster at left, © by Abbott Laboratories

plant and community to make the fullest use of its labor—potential as well as the present working force.

"It is based upon the policies that the National Management-Labor Policy Committee of the War Manpower Commission has recommended. It is implemented locally only after thorough consultation with management and labor in area manpower committees to fit the plan to the local situation.

"In recent months, the United States has streamlined its manpower program to such an extent that now, after a little more than a year at war, it has the plans for seeing that every man and every woman is enabled to do the most personally to help win the war."

Job stabilization programs already have been placed in effect in certain industries and in several areas where war production is heavy, including such cities as Baltimore, Detroit and Cleveland.

The Cleveland program, praised by WMC officials as one of the best yet devised, provides:

No worker now engaged in war production or any activity necessary to the security of the civilian population, such as agriculture, transportation, communications, public utilities, police and fire protection, teaching and public health service shall change jobs unless he can obtain a "statement of availability" from his current employer or through the United States Employment Service.

Prohibition against hiring or recruiting, except with consent of the USES, of highly skilled and acutely scarce craftsmen, such as tool and die designers and toolmakers.

Recent migrants to the area shall not be hired unless USES is satisfied that the employment of outsiders is inescapably necessary to the continuance of full-scale war production.

A special review department of the USES shall be set up to investigate and pass judgment on the claims by workers that their employers have unjustly denied them statements of availability necessary to make a job change.

Seniority rights shall be preserved for workers who, at the instance of official agencies, are shifted from one plant to another in the interests of the war effort.

Statements of availability shall be granted to workers desiring to change jobs if they can show the shift would further the war effort or for compelling personal reasons.

The local programs are drafted by

HOW TIMES HAVE CHANGED: A few years ago sights like the man pictured above pleading for any kind of a job were common. Today the reverse is true and employers resort extensively to advertisements in an attempt to maintain a full working force

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★★★★★★★★★★★★★★★★★★★★★

MEN WANTED

...TRY

...DUCTION

WHO ARE...

...haven't the guts to make the stuff they ... They're staking their lives. Will you let them down?

...y is good. But more than that, you'll get ...atisfaction of doing a job that's *really important to winning this war!* A JOB NO WOMAN CAN DO!

A MILITARY SECRET

The situation is tough—plenty tough. Here's just one example. On New Year's Eve, three big furnaces in the Erie-Niagara frontier were forced to shut down. Furnaces that were making materials for tanks, bombers and guns. They shut down, not because of lack of materials, but because *there weren't enough men to run them!* Those furnaces are still cold. The production they've lost in those eight days since New Year's Eve is a military secret. But it would make you sick if you knew.

If you have a son, brother, or father in the service, what do you think they're saying about us at

YOUR SISTER COULDN'T DO IT

This is *your* big chance. If you're in some non-war job, or in a war industry doing work someone else could do, you're needed for the high-temperature and metal fabricating concerns of heavy industry. Don't worry about letting your boss down. We'll ask him to release you. You're needed for the kind of work you wouldn't want your sister or wife to do—and they couldn't do it if they tried. Because we wouldn't kid you . . . THIS WORK IS TOUGH!

ACT TODAY!

So if you really want to keep those tanks and guns moving over there in a stream that'll make Hitler wish he'd never been born—DON'T WAIT! Go now—today—tonight—to the nearest address below. Say you want to sign up with the *Shock Troops of Production*—the STP—you'll get honor attention. Because it's only you and guys like you who can reopen those furnaces and bring all heavy industry back to capacity production!

WAR MANPOWER COMMISSION

AND THE BUFFALO-NIAGARA AREA COMMITTEE

APPLY AT U. S. EMPLOYMENT SERVICE, 51 ERIE ST., BUFFALO
Between Franklin and Pearl Sts.

8:30 A. M. TO 10 P. M., MON. THROUGH SAT.

NIAGARA FALLS
220 FIRST ST.

LOCKPORT
5 RACE ST.

DUNKIRK
65 E. FOURTH ST.

WPB'S CURRENT REPORT ON MANPOWER

EMPLOYMENT (CENSUS)

November, 1942	Number	Per Cent Increase from Nov., 1941	Per Cent Increase from Nov., 1940
Labor force	54,500,000	0.7	1.5
Unemployed	1,700,000	—56.4	—77.0
Employed	52,800,000	5.2	14.0
Nonagricultural	43,000,000	4.4	14.4
Male	29,100,000	— 1.4	5.8
Female	13,900,000	18.9	37.6
Agricultural	9,800,000	8.9	12.6
Male	8,400,000	2.4	1.2
Female	1,400,000	75.0	250.0

LABOR DISPUTES (NWLB)

Man-days of idleness on strikes affecting war production November, 1942	91,925
Percentage time lost to estimated time worked, November, 1942	3/100 of 1%
Percentage time lost to estimated time worked, October, 1942	5/100 of 1%

labor-management committees on which sits a representative of the War Manpower Commission.

The commission emphasizes that it does not intend to restrict all hiring and recruiting to the USES. In fact, the field offices are not adequately staffed to handle the job and even the limited activities they now are doing has resulted in many complaints of delays on the part of both workers and employers.

Mr. McNutt said that company personnel offices and union hiring halls will continue to function, but that their operation must serve total overall manpower objectives and follow the policies of the commission toward stabilization.

Preparatory to extending manpower control to all industrial areas, the WMC has made studies of 272 such areas. It found that 31 districts already are experiencing acute shortages; 95 anticipate scarcities; 146 either have enough male labor to meet present demands or have a surplus.

Buffalo reports a "desperate" shortage in heavy industries which has forced three ferroalloy furnaces to shut down and caused WMC officials to liberalize restrictions on shifting war workers from one plant to another.

Transfer of workers from areas which have surpluses to those which have shortages no longer is feasible because the heavy war production centers already are "bursting at the seams." Housing, transportation and sanitation facilities just won't accommodate the heavier loads that would be imposed by in-migration.

The solution apparently lies in the redistribution of present labor force and the enlargement of the force locally by the absorption of larger numbers of women workers, Negroes, the foreign born, overage and handicapped persons.

This expansion of local potentialities will necessitate an enlargement of training programs. Major war production plants already have such programs in operation and are advertising for inexperienced workers, offering to train them on the job.

WMC's Apprentice and Training Service during the past year has assisted an average of 1100 establishments monthly to set up on-the-job and apprentice training plans.

"As the result of the work of this agency, thousands of production workers and skilled craftsmen have been made available to our war plants," Mr. McNutt said. "Many thousands more can be added to our industries if employers, badly in need of trained workers, more fully utilize the agency and its field representatives."

Navy Yard Has 1400 Women, Jobs Once Held by Men

SHIPBUILDING, which has held to the all-male tradition longer than any other war industry, at last has given way to the pressure of manpower shortage and is opening its gates to an influx of women workers. Government Navy yards have taken the lead in employing women and 1400 now are at work in the large Washington yard alone. Private yards, however, are following suit and one Alabama yard plans to hire 1000 women welders.

WOMANPOWER IS "MANPOWER": Typical middle-aged woman worker operates a 30-inch lathe in the Washington Navy Yard. She is one of 1400 employed in the yard

In comparison with other war plants, ship yards still have a low proportion of women workers, estimated at 3 per cent at present. War Manpower Commission officials, however, predict this will rise rapidly in the next few months.

WMC Chairman Paul V. McNutt estimates that 30 per cent of all war workers by the end of the year will be women, compared to 40 per cent of all nonwar workers. In the aircraft industry, there will be more women than men.

Other industries employing a large percentage of women: Electrical machinery, 36 per cent; communications equipment, 48; scientific and technical instruments, 34; electrical equipment, 27; small arms ammunition, 35; other ammunition, 28; chemicals and allied industries, 23; rubber products, 33; firearms, 22.

Even in heavy industry, such as ordnance, 19 per cent of the workers are

WE HAVE COME A LONG WAY. Safety and other working conditions in war plants today are vastly improved over those of the first World War. Above, women tend a long line of lathes, left, in the Washington Navy Yard, and, right, operate gear cutting machines in the same plant. At left is a scene from a 1918 machine shop showing women working among a maze of dangerous belts and other moving parts

—o—

women. In the manufacture of guns of 60-calibre and over, and in tanks, both of which involve heavy metal work, the proportion of women is 9 and 7 per cent respectively. In the iron and steel industry itself, at least 9 per cent of the labor force is made up of women.

Proportion of women in any industry varies widely from place to place. The degree to which women are used depends on the degree of labor shortage in the area. Where the male labor supply is nearing exhaustion, industry is willing to try women in more and more jobs for which only men formerly would have been considered. As the need has increased, women have demonstrated their ability to fill almost any kind of job.

Study Workers' Health as Absenteeism Preventative

CHICAGO

HEALTH of industrial workers takes on additional significance in war time because of the rapid increase in employment and the absorption into industry of many people having no experience in factory work. How to meet the new problems and growing importance of old problems arising in connection with the country's all-out war production was the subject of a conference in the Palmer House, here, Jan. 13, under auspices of the Illinois Manufacturers' Association, Illinois State Department of Public Health, and Chicago Medical Society. A number of related groups co-operated. Theme of the meeting was "Keep 'Em Working."

One of the topics emphasized was absenteeism, an impressive proportion of which is said to be due to sickness.

Speaking on "Why Do Employes Stay Away from Work and What Can We Do About It?", Dr. Clarence D. Selby, medical consultant, General Motors Corp., Detroit, stated: "In the effort to maintain the health and persons of the employes at the highest possible production level, the pre-employment examination—to the exclusion of the unfit—has been changed over to the preplacement examination—for selective employment of substandard as well as whole and healthy people. The time-tried functions of industrial hygiene control, care of occupational injuries and diseases, temporary treatment of minor ailments and emergency sicknesses, medical consultations, health education, and record keeping, continue to be useful and important as heretofore.

"Methods for relieving workers of their worries, maintaining their proper nutritional status, and preventing fatigue are being developed, and studies of sickness absenteeism are coming into practice.

"Realizing that a great many doctors, not directly connected with the industries, treat sick workers and consequently are influential in determining absenteeism from sickness, a more understanding relationship between the professional and industrial medicine is being cultivated.

"In measuring the effectiveness of the

(*Please turn to Page* 116)

U. S. Pipe & Foundry Purchases Interest in Sloss-Sheffield

UNITED States Pipe & Foundry Co., Burlington, N. J., has purchased a substantial working interest in the Sloss-Sheffield Steel & Iron Co., Birmingham.

While details have not been announced, it is known that U. S. Pipe & Foundry has acquired Allied Chemical & Dye Corp.'s holdings of 34,500 common shares in Sloss-Sheffield, with an apparent market value of about $4,196,500, based on recent bids. This gives U. S. Pipe & Foundry 55 per cent ownership of Sloss-Sheffield common; preferred shares, however, have equal voting rights and the common shares acquired represent 42.6 per cent of total voting power.

Sloss-Sheffield operates four blast furnaces in the Birmingham district with annual capacity of between 550,000 and 600,000 tons. It also operates 120 Semet-Solvay by-product coke ovens with annual capacity of 614,000 tons, and owns ore and coal mines and limestone quarries near Birmingham.

U. S. Pipe & Foundry operates plants at Burlington, Birmingham and Bessemer, Ala., Addyston, O., and Chattanooga, Tenn. Chief product is cast iron pipe, although it also manufactures and sells some machinery used in the sugar and chemical industries and does a jobbing foundry business.

Purchase of the Sloss-Sheffield interest reportedly was prompted by desire for a more stable source for pig iron.

Sloss-Sheffield Steel & Iron Co. was incorporated in 1899 as result of the consolidation of the Sloss Iron & Steel Co. (formed in 1887) with several other companies. Waddill Catchings is chairman of the executive committee and Hugh Morrow is president.

United States Pipe & Foundry Co. was incorporated in 1899 in New Jersey as the United States Cast Iron Pipe & Foundry Co., consolidating a number of plants engaged in the production of cast iron pipe. The present title was adopted in 1929. N. F. S. Russell is president.

Strikes Halt Canadian Steel Mills

TORONTO, ONT.

APPROXIMATELY 65 per cent of the Dominion's steel production was halted last week by strikes. Five thousand workers of the Sydney, N. S., plant of the Dominion Iron & Steel Corp. Ltd. walked out Jan. 12 after their demands for a basic wage increase to 55 cents an hour had been rejected by the three-man Barlow Commission.

Similar action was voted by about the same number of workers at the Algoma Steel Corp. Ltd., Sault Ste. Marie, Ont., who also were party to the demand for increased wages.

The walkout at these primary steel plants means the shutting down of 65 per cent of Canada's total steel production, and unless immediate settlement is reached will have serious results on Canadian war materials production of all classes. The Steel Co. of Canada Ltd., Hamilton, Ont., so far has not been affected by the strike and at week's end was the only major iron and steel company in production. Companies operating electric furnaces also were not affected.

"Renegotiation Increasing Costs"

CHICAGO

GOVERNMENT contract renegotiation by army and navy boards is increasing war costs, slowing production, and placing a premium on inefficiency, declared A. G. Bryant, president, Bryant Machinery & Engineering Co., Chicago, in addressing members of the Associated Equipment Distributors holding their annual convention last week.

"The inexperienced, sloppy manufacturer," he said, "can let his costs run wild, can condone shop inefficiency and waste. By so doing, he narrows his margin of profit and is therefore less subject to attack by one of the renegotiation boards."

Mr. Bryant, a member of the WPB machine tool industry committee, and past president of the Associated Machine Tool Dealers of America, commended the government's aim of preventing another crop of war millionaires, but criticized the renegotiation method as "probably unconstitutional."

Citing recent figures that both the army and navy renegotiation boards had accounted for about $125,000,000 in refunds on contracts, Mr. Bryant said:

"First, if these figures had remained in the profits of the various companies, at least 80 per cent, according to present tax laws, would have been returned in taxes to the treasury department.

"Second, the companies that have made such refunds are going to have no desire in 1943 to cut their costs or even maintain their efficiency of 1942. From a selfish standpoint, they would prefer to have higher costs, smaller profits, and thus be less subject to the pressure of renegotiation.

The system, the speaker contended, ignores the fact that many contracts are based on ceiling prices, and provides no redress to a contractor who may sustain loss. As an alternative, Mr. Bryant proposed governmental steps to encourage lower costs and increased production, saying "when profits have been earned that are excessive, let them be taken by taxation."

Reinforcing Bar Output To Be Concentrated in Rerolling Mills

To preserve skilled manpower and facilities of steel rail rerolling mills for the war effort, a large part of the now limited production of concrete reinforcing bars will be concentrated in these mills, according to Hiland G. Batcheller, director, WPB Steel Division.

Rail rerolling mills produce steel bars, processed from old railroad rails, which are adaptable for many purposes, including the reinforcement of concretee.

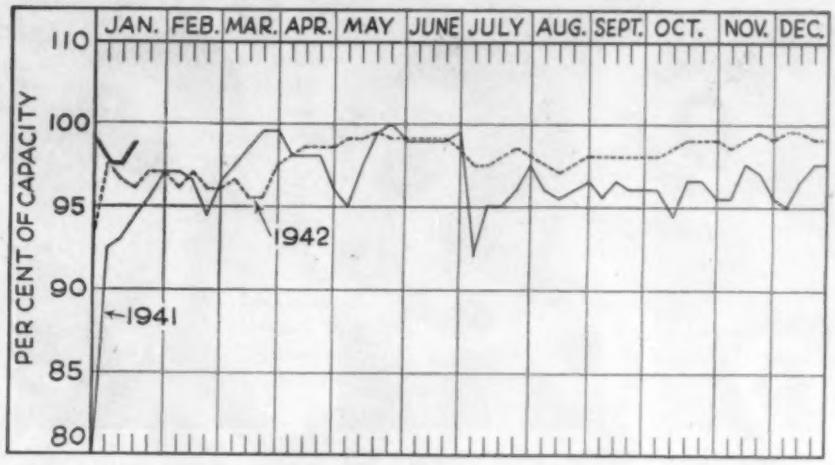
As a result of the various limitation orders on the use of steel, and because the construction program is nearing completion, the operations of rail rerolling mills have been seriously curtailed, Mr. Batcheller said. In some cases, temporary shutdowns have resulted and in other cases, shutdowns are imminent.

The action taken by the Steel Division, through production directives and special directives, prohibits steel mills (except those located in California, Washington, and Oregon) from producing concrete reinforcing bars, except sizes which rail rerolling mills do not regularly produce, or bars whose specifications cannot be met by rail steel quality.

Production of concrete reinforcing bars has been declining steadily during the past few months, as the demands of the construction program tapered off. Output is currently estimated at about 75,000 tons a month. Average monthly production was 150,000 tons in 1942.

In order to divide equitably the tonnage of bars which will be produced, rail rerolling mills are limited by the directives to an operation not exceeding 40 hours per week per mill.

Mills in the three western states were not required to cease production of concrete bars because rail steel production facilities in that area are small.



STEEL INGOTS . . . UP

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week gained 1½ points to 99 per cent of capacity as the last effects of the Ohio river flood were overcome. Five districts advanced, four declined and three were unchanged. A year ago the rate was 96 per cent; two years ago it was 94½ per cent, both computed on the basis of capacity as of those dates.

Chicago—Up 2 points to 102 per cent as several open hearths were returned to service after repairs. Scrap no longer is factor.

Cincinnati—Following subsidence of high water, steel production rebounded to 97 per cent, a rise of 24 points from the preceding week.

Detroit—Steel production advanced 1 point to 93 per cent. Two open hearths are down for repair.

St. Louis—Unchanged at 93 per cent for the fourth week.

Cleveland — One open hearth was taken off, reducing production 2 points to 91 per cent.

Buffalo—Loss of an open hearth by one interest reduced production 2½ points to 90½ per cent.

Pittsburgh—Declined 1 point to 97½ per cent as furnace repairs became necessary.

Wheeling—Recovery from flood conditions caused production to increase 10 points to 80 per cent.

New England—After two weeks at 100 per cent production dropped 5 points to 95 per cent because of repair necessity.

Central eastern seaboard—Gained 1 point to 96 per cent.

Birmingham, Ala.—Steady at 95 per cent, with probability of rising to 100 per cent this week when an additional open hearth will be lighted.

Youngstown, O. — Maintained steel production at 97 per cent, which has prevailed for 11 weeks. Furnaces idle for repair are being kept down to six or seven by various short cuts.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week ended Jan. 16	Change	Same week 1942	Same week 1941
Pittsburgh	97.5	—1	95	95.5
Chicago	102	+2	101	98.5
Eastern Pa.	96	+1	89	96
Youngstown	97	None	84	94
Wheeling	80	+10	89	100
Cleveland	91	—2	90	89
Buffalo	90.5	—2.5	79.5	90.5
Birmingham	95	None	90	100
New England	95	—5	100	100
Cincinnati	97	+24	91.5	88.5
St. Louis	93	None	81	87.5
Detroit	93	+1	86	95
Average	99	+1.5	*96	*94.5

*Computed on basis of steelmaking capacity as of those dates.

Year's Pig Iron Output 7.16 Per Cent Over 1941

Pig iron production in 1942 was 59,334,735 net tons and ferromanganese and spiegeleisen 647,422 tons, according to the American Iron and Steel Institute. This is a total of 59,982,157 tons of blast furnace products, an increase of 4,064,071 tons, 7.16 per cent, over 55,918,086 tons made in 1941, and represents production at 99.2 per cent of capacity for the year.

A new record thus is established as the 1941 total was the largest to that time. In 1929 blast furnaces produced 47,342,605 tons, a figure which stood as a peak until 1941.

December pig iron output was 5,143,829 tons, compared with 5,026,220 tons in November and 5,165,012 in October, loss of a day in November accounting for the lower tonnage. Ferromanganese and spiegeleisen output in December was 57,594 tons, compared with 57,707 tons in November. Total blast furnace production was 5,201,423 tons, against 5,083,827 tons in November. The December production represented 101.1 per cent of capacity.

Plate Output Doubled in 1942; Nearly Half Rolled on Strip Mills

Steel plate shipments during 1942 were approximately double the 1941 production and set a new annual record, Hiland G. Batcheller, director, WPB Steel Division, announced.

During the past year, 11,809,938 net tons of steel plates were shipped. Most of this tonnage was for shipbuilding and other urgent war requirements, the remainder going to essential civilian needs such as railroad equipment and for export. Of this total, 5,194,022 net tons were produced on continuous strip mills, which were converted to plate production.

The 1942 tonnage compares with total plate shipments of 5,986,535 net tons in 1941. This latter figure was the previous annual record. The highest total for the first World War was 5,119,908 net tons in 1918.

In December, plate shipments totaled 1,060,039 net tons, of which 490,487 net tons were produced on strip mills. The record month thus far was in July, this year, when a total of 1,124,118 net tons were shipped.

Additional plate production has been directed for the month of January and it is expected that this month's total will exceed the July record. New mills, capable of producing approximately 150,000 net tons per month, are under construction and will become available in the latter part of the second quarter of the year.

Industrial Gear Sales Increased 32 Per Cent

American Gear Manufacturers' Association, Pittsburgh, reports industrial gear sales for December were 23.5 per cent above December, 1941, and 16.5 per cent below those of November, 1942. Sales in 12 months ended Dec. 31 were 32 per cent above those in the year before.

This compilation applies only to industrial gears and does not include automotive gears or those used in high-speed turbine drives.

MEN of INDUSTRY

E. G. HARTMANN

DOUGLAS W. VERNON

JOHN S. MORRIS

L. F. SKUTT

E. G. Hartmann has been promoted to assistant general manager of sales, John A. Roebling's Sons Co., Trenton, N. J. His entire business career has been in the steel industry. In 1941 he was made manager of Round Wire and Flat Wire Specialties Division to assist the general manager of sales.

Douglas W. Vernon, associated with the Roebling company 20 years, and previously chief of the Priorities Division, has been made assistant to the general manager of sales.

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Malcolm Farmer has resigned as director and executive vice president, Phoenix Iron Co., Phoenixville, Pa.

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David W. Hopkins, secretary and director, R-S Products Corp., Philadelphia, has been elected vice president. He will continue in charge of the company's Valve Division.

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Robert H. Gibb, for several years associated with the Pittsburgh district sales staff of Allegheny Ludlum Steel Corp., and recently assistant district manager, has been named district manager of that office.

Arnold W. Nelson has been made district representative in the Minneapolis territory for Allegheny Ludlum, with headquarters at 3512 Glencrest road, Minneapolis.

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John W. Votypka, for 30 years active in automotive engineering circles, most recently with Fruehauf Trailer Co., and prior to that with Briggs Mfg. Co., Detroit, has been appointed to the regional staff of the War Production Board in Detroit. He will be head industrial specialist of the production service and smaller war plants divisions, and will concentrate his attention toward assisting companies which seek more war work and also those which have not been active as yet in war production.

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John S. Morris has been appointed methods engineer, By-Products Steel Corp., Coatesville, Pa., subsidiary of Lukens Steel Co. Prior to joining Lukens as assistant consulting engineer of the new facilities program a year ago, Mr. Morris was assistant general manager, Steel Division, Alan Wood Steel Co.

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Davis Thomson, formerly vice president in charge of operations, Great Lakes Steel Corp., has been appointed to a similar position with Phoenix Iron Co., Phoenixville, Pa., succeeding Malcolm Farmer, who recently resigned as executive vice president. He also succeeds Mr. Farmer as a director.

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R. W. Beard, who formerly handled planning and execution of the General Electric Co.'s Federal and Marine program in the San Francisco territory, has been named assistant to the manager of the company's Lighting Division in Schenectady, N. Y.

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Edwin Olney Jones has been elected a vice president, Federal-Mogul Corp., Detroit. Mr. Jones, who continues as sales manager of the company's original equipment division, has been associated with Federal-Mogul since its organization in 1924, and has been a director since 1929.

Guy S. Peppiatt has been made executive assistant to the president. He will continue as comptroller.

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E. E. Haubegger has been appointed district sales manager for Republic Steel Corp. in Houston, Tex. Before joining the Houston sales force in 1936, Mr. Haubegger was for seven years assistant district sales manager for Republic Supply Co. in the same city. He became assistant district manager for Republic Steel in 1940. He succeeds **Gordon F. Hess,** recently named district sales manager for Republic in Detroit.

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L. F. Skutt has been appointed general sales manager, Nash Motors Division of Nash-Kelvinator Corp., Detroit. Mr. Skutt, who joined Nash-Kelvinator in August, 1942, and who has been serving on Pierce's staff and as manager of the company's Chicago zone, was previously associated with General Motors Corp. for more than 20 years.

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J. D. Shaw, formerly research and production engineer, Metals Disintegrating Co., has joined Aircraft Parts Development Corp., Summit, N. J., as chief powder metallurgist.

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Robert Gordon has retired after almost 44 years of service in the New York office of American Steel & Wire Co., United States Steel Corp. subsidiary. He is succeeded as assistant treasurer by **Charles A. Johnson,** credit manager in the New York area. Mr. Gordon joined the company in March, 1899, when he started as a clerk in the treasury department. Mr. Johnson joined the company's New York office in March, 1917, as a credit clerk, subsequently becoming assistant credit manager and credit manager.

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W. E. Hirtensteiner has been appointed executive vice president, Interstate Aircraft & Engineering Corp., Los Angeles. **Walter A. Hite,** vice president in charge of engineering, has been elected to the board of directors.

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Gunnar Edenquist has been elected vice president and assistant general manager, Kinner Motors Inc., Los Angeles. **Walter G. Milka** has been named

vice president in charge of production. Mr. Edenquist has been with the company since 1929 in an engineering and sales capacity, while Mr. Milka, also associated with the company since 1929, has been line foreman and shop superintendent.

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Allan W. Fritzsche has been elected president and general manager, General Industries Co., Elyria, O. Vice President and general manager since 1932 and more recently treasurer also, Mr. Fritzsche succeeds **A. W. Neracher,** who has been elected chairman of the board.

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Charles F. Billings, for 19 years assistant superintendent, Westinghouse Lamp Division plant at Trenton, N. J., has been named industrial relations manager of the division, with headquarters in Bloomfield, N. J. He succeeds **Walter F. Oliver,** who has been granted a leave of absence to become director, Civilian Personnel Branch, United States Army Ordnance Department, New York.

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Leonard T. Blaisdell, commercial vice president for General Electric Co. at Cleveland, was given an honorary degree of electrical engineer at the winter graduation of Case School of Applied Science, Cleveland, in recognition of his "long and distinguished professional record". Mr. Blaisdell has been manager since 1939 of General Electric activities in the East Central district.

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Bernard H. Sullivan, manager of sales, Westinghouse Lamp Division, Bloomfield, N. J., has been assigned responsibility for all commercial activities involving lamps and special products, and **Ralph C. Stuart** has been appointed manager of manufacturing and engineering for the division. Mr. Sullivan will continue to have charge of the illuminating engineering and commercial engineering departments, as well as sales, advertising and division district offices.

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C. A. Thayer has been appointed consulting engineer, Republic Steel Corp., Cleveland. Mr. Thayer, who held the position of chief engineer since 1930, is on leave of absence because of health.

R. H. Bahney, formerly assistant chief engineer, has been made chief engineer of steel plants and mines, and **F. M. Darner** has been named chief engineer of manufacturing divisions. Mr. Darner formerly was assistant chief engineer, specializing in the manufacturing divisions.

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T. C. Fockler, of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been appointed a member of the American Standards Association's subcommittee on ball and roller bearings and standardization of shafting.

Otto Z. Klopsch, of the Wolverine Tube Division of Calumet & Hecla Consolidated Copper Co., Detroit, has been made a member of the association's subcommittee on minimum requirements for plumbing and standardization of plumbing equipment.

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Lee Kahn, the past 25 years vice president, L. A. Cohn & Bro. Inc., Chicago, nonferrous metal broker and refiner, has severed his connection with that company.

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Handford E. Eckman, since 1937 plant superintendent, Piper Aircraft Corp., Lock Haven, Pa., has been promoted to plant manager. **Findley A. Estlick,** assistant plant superintendent, has been advanced to general plant superintendent, and **Richard C. Barber,** in charge of wing construction and sheet metal work, has become assistant plant superintendent.

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James C. Gray, chief inspector and superintendent of industrial relations for Tennessee Coal, Iron & Railroad Co.'s coal mines, Birmingham, Ala., has been named general superintendent of coal mines, succeeding **R. E. Kirk,** recently made assistant to vice president in charge of raw materials.

J. J. Phifer, assistant general superintendent, Fairfield Steel Works, has been promoted to general superintendent of the works, replacing **J. M. Spearman,** now assistant to vice president in charge of manufacturing operations. **Dudley Vaughn,** superintendent of the open-hearth department, Fairfield Steel Works, has become assistant general superintendent, succeeding Mr. Phifer.

A. J. Blair, head of the geological department, has been assigned to report to **A. B. Haswell,** newly appointed assistant to vice president in engineering and construction.

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John Rosevear, veteran engineer of 20 years' service, has been appointed staff assistant in the industrial engineering and equipment department, Westinghouse Lamp Division, Bloomfield, N. J. **Eugene G. Haas** will succeed Mr. Rosevear as superintendent of works engineering in charge of buildings, grounds and service. Mr. Haas formerly was assistant superintendent of construction at the Westinghouse Merchant Marine plant, South Philadelphia, Pa.

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Col. John C. Minor, the past 14 years manager of cylinder sales for Taylor-Wharton Iron & Steel Co., New York, has been granted a leave of absence to become consultant on gas cylinders with the War Production Board, Washington.

R. C. STUART

B. H. SULLIVAN

H. E. ECKMAN

COL. JOHN C. MINOR

WPB-OPA RULINGS

PRIORITIES–ALLOCATIONS–PRICES

Weekly summary of orders and regulations issued by WPB and OPA, supplementary to Priorities-Allocations-Prices Guide as published in Section II of STEEL, Dec. 14, 1942

M ORDERS

M-18-b (Amendment): **Chromium Chemicals,** effective Jan. 7. Requires consumers to file Pd-54 only with WPB and not with suppliers. Exempts users of less than 500 pounds of primary chromium chemicals a month from filing this form.

M-39 (Amendment): **Cobalt,** effective Dec. 28. Permits use of cobalt in all driers and in all nonferrous alloys.

M-43 (Amendment): **Tin,** effective Jan. 9. Restricts tin content of solders from 30 per cent formerly permitted to 20 per cent. Eliminates exceptions to quota restrictions previously granted to certain rated orders. Permits use of tin only where the use of secondary tin is not possible. Schedule I lists 16 classes of products in which tin may be used; List A includes 27 classes of products for which the use of tin is specifically forbidden; List B sets forth uses which are forbidden except when specifically authorized by WPB.

M-81 (Amendment): **Cans,** effective Jan. 6. Permits unlimited packing of oysters in one-gallon metal cans made of chemically treated blackplate until April 30, 1943. Permits packing of baking powder in fibre cans with metal ends until June 30. Permits use of hot dipped plate to the extent necessary in cans for packing specified vegetables and fish, until electrolytic mills are in a position to increase production of electrolytic plate. Specifies can size of drain cleaners at 12 ounces.

Effective Jan. 13, canners may use unlimited numbers of cans for packing seasonal soups and 75 per cent of amount they used in 1942 to pack non-seasonal soups. Restrictions eased also on certain canned meats.

M-81-a (Revocation): **Tin Plate, Terne Plate,** effective Jan. 11. Revokes order which directed the use of electrolytic tin plate and chemically treated black plate in cans for specified products. Provisions now incorporated in M-81.

M-136 (Revocation): **Blackplate,** effective Jan. 11. Revokes order which limited the use of blackplate to cans chiefly for chemicals, paints, and edible oils. Provisions now incorporated in M-81.

P ORDERS

P-56 (Amendment): **Mines,** effective Jan. 8. Assigns domestic metal, non-metallic and coal mines rating of AA-1 for purchase of all repair items for first quarter; AA-1 for 50 per cent of materials used in manufacture of mining equipment and AA-2X for remaining 50 per cent.

P-19-d (Amendment): **Defense Housing;** P-19-h (Amendment): Defense Project, effective Jan. 12. Assigns blanket preference rating of AA-3 to deliveries of materials for use in construction of most of the war housing projects programmed by the National Housing Agency. Is effective whether the war housing is publicly or privately financed, whether it is new construction or conversion of existing structures, and whether the type of structure is permanent or temporary. Raises all AA-4 ratings assigned by preference orders of the P-19 series to AA-3. Builder is responsible for extending new ratings to his suppliers in accordance with Priorities Regulation No. 12.

P-53 (Amendment): **Defense Housing Projects,** effective Jan. 12. Assigns blanket rating of AA-3 to deliveries of materials for use in construction of most war housing projects programmed by the National Housing Agency.

L ORDERS

L-157 (Amendment): **Hand Tool Simplification,** effective Jan. 8. Add simplification schedule V covering forks, rakes, hoes, hand cultivators and numerous other gardening implements and industrial tools. Victory tools for Victory gardens, if manufactured after April 8, must conform to the simplified patterns and styles prescribed in the new schedule. All tools listed must be fabricated from suitable grades of carbon steel after the effective date of the order. No alloy steel may be put into process by any manufacturer after April 8 in the making of any of the listed tools. Producers may complete the processing and fabricating until May 8 of tools put into process prior to April 8.

L-196 (Amendment): **Used Construction Equipment,** effective Jan. 10. Bans export of equipment unless authorized by WPB and licensed by BEW. Exempts exports by Army, Navy, Maritime Commission, War Shipping Administration, or their agents.

L-122: Floor Maintenance Machines, Industrial Vacuum Cleaners, effective Jan. 8. Prohibits production of floor sanding, finishing and maintenance machines, after March 15, and limits production of industrial vacuum cleaners. Permits manufacturers to begin fabrication of parts not later than Jan. 15 from materials still in the form in which they were received. Restricts sale, rental and

OBITUARIES . . .

William H. Edgerley, 80, associated with the New York office of Lukens Steel Co., Coatesville, Pa., for 51 years, and well known to the eastern steel trade, died Jan. 10, at his home in Brooklyn, N.Y., following a long illness. He served as district manager for many years.

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George L. Gaylord, 71, president and treasurer, Westfield Grinding Wheel Co., died Jan. 9, at Springfield, Mass.

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William R. Thomas, 77, retired chief engineer, E. D. Jones & Sons Co., Pittsfield, Mass., died Jan. 9, in that city. He was associated with the company 47 years.

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George E. Smith, 43, industrial agent, New York Central railroad, Chicago, died Jan. 8, in that city.

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John T. Fagan, inventor of modern lamp machinery for General Electric Co., died Jan. 2, in Cleveland. For more than 40 years, 25 of them as manager of the lamp equipment and equipment development works of General Electric lamp department, Cleveland, Mr. Fagan contributed many important inventions to the lamp-making art. He retired from General Electric in 1938 to take an active part in the affairs of the T. & F. Engineering Co., where he was chairman of the board.

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Percy F. Hord, 74, for many years assistant secretary-treasurer, National Wholesale Hardware Association, Philadelphia, died Jan. 7.

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Frank C. Winters, 39, manager of the Cincinnati office of Electric Controller & Mfg. Co., Cleveland, died in Cincinnati, Jan. 10. He was once associated with the Philadelphia Electric Co.

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John S. Y. Fralich, 59, district engineer, Westinghouse Air Brake Co., Chicago, died in that city, Jan. 5.

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Fred C. Koch, 73, founder and president, Columbia Metal Stamping Co., Cleveland, died Jan. 13, in that city. He founded the company in 1904.

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Otto Jabelmann, vice president of research and mechanical standards, Union Pacific railroad, Omaha, Nebr., died in London, England, Jan. 6. He had been serving recently as an assistant to W. Averell Harriman, United States lend-lease administrator to Great Britain.

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Frank H. Van Houten, 89, founder, Dutchess Tool Co. Inc., Beacon, N. Y., died in that city, Jan. 10. He founded the company in 1886 and remained its head until his retirement in 1941.

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Charles C. Swift, 63, president, Ohio Machine Tool Co., Kenton, O., died in Columbus, O., Jan. 10.

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Edgar Palmer, 62, chairman of the board and former president, New Jersey Zinc Co., died Jan. 8, at his home in Princeton, N. J.

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M. Howard Cox, 57, for many years sales representative of Fafnir Ball Bearing Co. and later with the personnel department of Chrysler Corp., Engineering Division, died at Detroit, Dec. 11.

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Dr. Henry Mace Payne, 65, mining engineer and metallurgist, died in Los Angeles, Jan. 7. He was at one time field secretary for American Mining Congress. In recent years he operated a metal alloy company in Burbank, Calif.

transfer of specified kinds of machines.

L-230 (Amendment): **Military Arms,** effective Jan. 6. Permits sale, as scrap material to dealers and melters, of parts for military arms discarded as unfit for use. Manufacturers disposing of materials must file monthly reports giving names and addresses of persons to whom the material is sold or delivered.

L-234: Industrial Type Instruments, effective Dec. 28. Requires manufacturers of industrial thermometers, pressure gages, control valves and other specified instruments to file monthly reports, showing productive capacity, requested future deliveries and previous month's production.

E ORDERS

E-1-b (Amendment): **Machine Tools,** effective Dec. 25. Orders must be accompanied by photostatic or certified copy of preference rating certificate under which buyer obtained his rating.

PRICE REGULATIONS

No. 49 (Amendment): **Iron and Steel Products at Resale,** effective Jan. 11. Establishes specific prices and maximum quantity extras at 30 points for bars, plates, structurals, sheets and strip. Prices named in general reflect the April 16, 1941, base date prices of sellers listed in the original price schedule No. 49.

No. 241 (Amendment): **Malleable Iron Castings,** effective Jan. 6. Provides alternative method for determining maximum prices of certain malleable iron castings. Castings involved are substantially the same as those which the seller contracted or agreed to sell before the base period of Oct. 1 to Oct. 15, 1941, established in price schedule No. 241 and which were not quoted in his published price list in that period. Seller may use as his maximum price for such castings the price at which he last contracted to sell the same casting or one substantially the same before Oct. 1, 1941. Adjustments may be made in accordance with his applicable charges, discounts and allowances in effect between Oct. 1 and Oct. 15, 1941.

No. 244 (Amendment): **Gray Iron Castings,** effective Dec. 26. Excludes from price control sellers whose net sales during 1942 total $40,000 or less. Provides sellers with an alternate method for establishing maximum prices for castings not sold during the base period, extends time for the filing of pricing methods and cost records, and supplements the record keeping requirements of the regulation.

Output of Sanding, Finishing Machines Prohibited by WPB

Production of floor sanding, finishing, and maintenance machines, after March 15, has been prohibited by WPB with issuance of Order L-222. Also, production of industrial vacuum cleaners has been placed under severe restrictions.

After March 15, fabrication of parts for assembly into new machines must stop entirely. Also after that date, assembly of new machines other than industrial vacuum cleaners is prohibited.

In the case of industrial vacuum cleaners, fabrication of parts may be limited by production quotas assigned by the director general for operations.

Production of repair parts in each calendar quarter of 1943 cannot exceed in manufacturing cost 2 per cent of each manufacturer's billed sales of machines duing 1941.

New Division Established in WPB Resources Group Under Paul Cabot

FORMATION of a Salvage Division of War Production Board was announced last week by Donald M. Nelson, WPB chairman. The division will be directed by Paul C. Cabot.

J. Widman Bertch, formerly chief of the Special Projects Salvage Branch, has been appointed deputy director of the new division.

Creation of the Salvage Divisioin follows resignation of Lessing J. Rosenwald as director of the Conservation Division of which salvage formerly was a branch. Mr. Cabot was deputy director of the Conservation Division in charge of salvage operations. The new division will be in the Resources Agencies group under the director general for operations.

"Setting up salvage as a separate division of the WPB is a recognition of the importance this work has played and must continue to play in the war effort," WPB Chairman Nelson stated.

"All 45 Furnaces Back"

"When government salvage operations were first started about a year ago as a branch of the Conservation Division the nation faced a critical situation in shortages of iron and steel, fats and greases, waste paper and other salvage items. At that time 45 steel furnaces were down because of lack of iron and steel scrap. The job of stimulating and intensifying public interest in the collection of iron and steel scrap to start these furnaces operating again fell to the Salvage Branch which was greatly aided in its efforts by many groups and civic organizations throughout the country."

Today all these furnaces are back again in full operation and none have been shut down because of any lack of iron and steel scrap since last summer.

Collection programs for other vital salvage items such as copper, silk stockings, tin cans, farm scrap, heavy scrap and rubber have been conducted through the year by the Salvage Branch of the Conservation Division.

"Although current inventories of iron and steel scrap are much improved over a year ago and other salvage conditions are in better shape, it is extremely important to realize that scrap needs in the future will be greater than ever," Mr. Cabot stated.

"Many situations which were well answered a year ago may again become acute," Mr. Cabot said. "Copper needs, for example, have grown enormously over the past 12 months and may require us to go after copper, brass and bronze items, non-essential, but in use today, in the near future to augment the scrap supply that has actively been sought throughout the year. Also, our need for heavy iron and steel scrap such as we get from farms, industry and specia! projects will be a continuing operation we can never slacken for a single moment.

"So it is highly important," Mr. Cabot concluded, "to remember that our salvage duties have only begun and our responsibilities for collecting it are not diminished by what has been done to date. Salvage is a continuing war effort and we expect the people of the country to be working at it for the duration."

MEETING . . . .

American Institute of Electrical Engineers—Maximum aid in war effort is the principal objective of the National Technical Meeting of the Institute in Engineering Societies building, New York, Jan. 25-29. Many of the sessions will deal with the use of existing equipment to conserve critical materials, and proposed guides for this will be presented.

Schwartz Sees World Scrap Currents Turn Toward America

Twenty countries are shipping scrap metals to the United States to relieve the critical scrap situation, it was stated by Benjamin Schwartz, chief of the Scrap Metals Section of the Board of Economic Warfare, at the fifteenth annual convention of the Institute of Scrap Iron and Steel Inc. in New York Jan. 16. This is a reversal of the normal situation under which the United States shipped large tonnages of scrap all over the world.

With steel production in 1943 expected to be close to 100,000,000 tons, representing an increase of at least 10,000,000 tons, millions of tons of additional scrap will be needed. A large proportion of the scrap collected in 1942 was of non-recurrent type, and "1943 will be a critical year that will test all the statistics of experts in a sensitive commodity like scrap, vagaries of the weather, organization talents of war agencies and public committees and the experience of the scrap industry."

WINDOWS of WASHINGTON

Value of Argentina's oil resources enhanced by reduced fuel imports. Government's share of national output reaches 64 per cent as National Mining Code restricts private operations

ARGENTINA'S growing production of oil provides a bulwark of economic strength, helping sustain its industry and transportation in the face of wartime difficulties of importing fuel from overseas. Argentina is said to be filling almost half of its present petroleum requirements from its own wells. The value of this oil to Argentine industry has increased because of shrinkage in coal imports.

Like other countries of South America, Argentina has been dependent in large part upon outside sources for coal and oil. Unlike Brazil, however, Argentina has a robust oil production of its own. Output has increased steadily for more than 20 years.

Today, Argentina has more than 3000 oil wells and approximately 100 wells producing gas. In 1941 the number of new wells drilled totaled 364. There are 19 refineries with an annual capacity of some 4,800,000 metric tons. Argentina has 31 tankers with capacity of about 85,000 tons.

Argentina, second in area and population and first in per capita wealth among the ten South American republics, stands ninth among the great oil-producing nations of the world. The countries exceeding Argentina in the order of volume of production are: United States, Venezuela, the Soviet Union, Iran, the Netherlands East Indies (before Japanese conquest), Rumania, Mexico and Colombia.

Despite relatively large national production—3,499,757 metric tons in 1941—this nation is still compelled to import both crude and refined oil products. Huge quantities are required for a great network of railroads and industries and the largest number of motor vehicles of any of the South American republics. In 1940, Argentina had 307,935 registered motor vehicles compared with Brazil's 205,722, Chile's 48,000, Colombia's 34,000, Uruguay's 28,823 and Peru's 22,216.

This is the second article dealing with South American industrial and commercial developments. The first appeared in STEEL, *Jan.* 11.

Argentina has not expropriated foreign-owned oil properties. Neither has Argentina left its petroleum development entirely in the hands of foreign companies or domestic private enterprise. However, to a considerable extent she has taken advantage of the special skills and abilities of foreign oil experts. And at the same time she has adopted a policy of gradually bringing the oil industry under the control and ownership of the national government.

In 1934 about a third of the oil production came from wells owned by the government while two-thirds came from wells in the hands of private owners. By 1941 these figures were sharply reversed —nationally controlled oil wells provided two-thirds of the production with the trend strongly upward—while privately-owned oil properties showed a relative decline.

Soon after discovery of oil in 1859 the government recognized its tremendous importance and explorations were rapidly expanded to further the new economic development.

The government soon passed a decree prohibiting all drilling within a radius of 15 miles from the location of the first well in the famous region now known as the Comodoro Rivadavia oil fields in the Province of Chubut.

Argentina soon made haste to reserve the right to control and supervise its source of liquid gold, which, with the passage of time, was to become a tremendously important factor in the nation's future industrial progress.

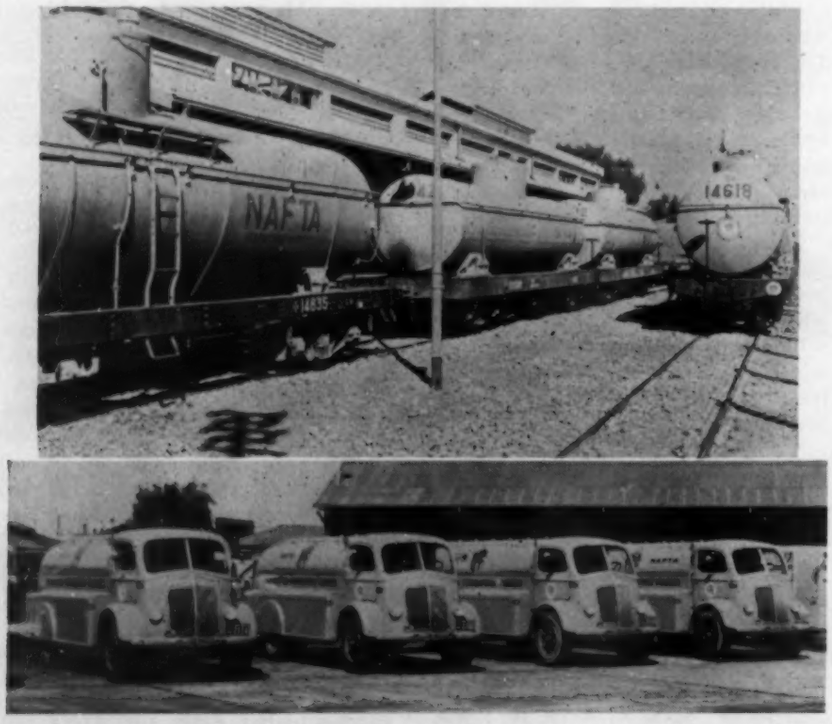
State Operations Increase

From an initial production of 5000 gallons of oil in 1907, production rapidly rose to a total of more than 100,000,000 gallons in 1939.

By 1923 Argentina was producing at the rate of 2,123,000 metric tons of petroleum annually and had reserves of 34,375 acres in the Comodoro Rivadavia and Plaza Huincul oil regions. From 1916 to the end of 1923 private industry also produced 372,059 metric tons. Private companies filed 7236 applications for permission to drill, hoping to cover an area of 20,229,000 acres.

Despite the large number of applications, by the end of 1923 the situation indicated that private production represented only 17.5 per cent of national extraction; whereas the government had extracted 1545 metric tons of oil for each two and one-half acres in reserve; private concerns had 55 acres reserved for each metric ton extracted.

As a result of these conditions, the government in 1924 resolved to extend the reserve zone and at the same time suspended admission of new drilling applications in national territories, whether on government or privately-owned lands.



Modern railroad tank cars and a fleet of the latest type American-built tank trucks are operated by the Yacimientos Petroliferos Fiscales, government-owned petroleum trust, to distribute final petroleum products to Y. P. F. filling stations throughout Argentina

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It also regulated future transactions in order that mining concessions be granted solely for the purpose of working them to prevent circumventing the aims of the National Mining Code. This measure rendered useless all previous private applications for drilling permits.

However, there still remained to be solved the important problem created by the then current practice of selling crude petroleum without refining. It was customary to burn crude oil in boilers of industrial plants, railroads and ships without utilizing the lighter components—which simply went up in smoke. To solve this problem the government in 1925 established its own refinery at La Plata.

Gen. Mosconi Gets Results

Credit for Argentina's petroleum program during the period between 1922 and 1930 is attributed to Gen. Enrique Mosconi. During this 8-year period General Mosconi managed to obtain an increase in government petroleum production from about 350,000 metric tons to approximately 900,000.

The government soon adopted a legal protectionist policy regarding its own petroleum interests. This legal policy declared that hydrocarbons—depending upon their location—belonged to the government or the provinces.

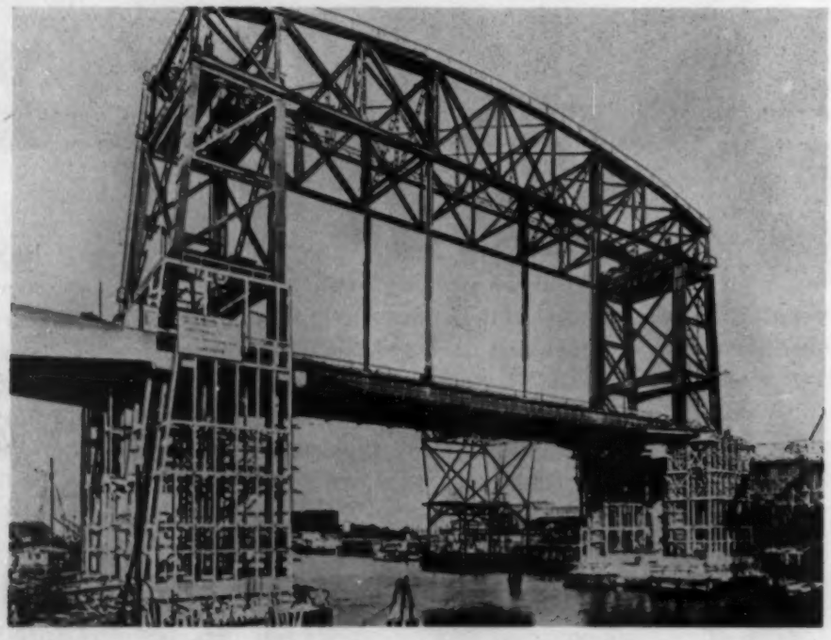
The national territories, representing about 42 per cent of Argentina's land area, were reserved either for government exploration and exploitation, or for joint development by the government and private concerns. About 33 per cent of the land area of the nation was left free to private initiative.

The government also decided to limit the importation of liquid combustibles and to adopt a system of agreements, designed to retain in its own hands the control of the distribution of gasoline and most other petroleum by-products.

Tanker is shown loading petroleum at a wharf near the famous Comodoro Rivadavia oil fields in Chubut Province, Argentina. The government has adopted a legal protectionist policy toward the oil region which produces over 100,000,000 gallons of oil per year

This policy soon led to consideration of the offer of an oil group of United States origin to sell Argentina its assets for the sum of $93,500,000, Argentine currency. The preliminary agreement had even been signed, but the term fixed for the option expired without being approved by the Argentine legislature.

Total 1941 production reached 3,499,757 metric tons. Of this total, 2,226,800 tons, or approximately 64 per cent, was government production and 1,272,957 tons or about 36 per cent was private production. This figure exceeded that of the previous year by 223,261 metric tons. While government production increased by 242,548 metric tons, private production decreased by 20,287 metric tons. Of the total in 1934, about 35 per cent consisted of national production and 62.53 per cent was private production. In 1941 government production went up to 63.63 per cent and private production fell to 36.37 per cent.



Argentina turns to steel-producing industries outside her borders for much of the material required in major construction. Shown above is a bridge engineered and built recently in Germany to span the Riachuello river at Buenos Aires. It has a platform that can be raised 70 feet to permit passage of the largest ships

Entire Output Up 8.9%

Petroleum production during the first six months of 1942, according to Argentine sources, amounted to 1,842,790 metric tons (government controlled production totaled 1,179,790 metric tons, and private output amounted to 663,291 metric tons). These figures compare with 1,692,689 metric tons yielded during the same period of 1941. This increase represents a gain of 8.9 per cent over the previous year. Government controlled production increased 9 per cent over the first half of 1941, and private

output gained 7.6 per cent in the period.

It has been estimated that Argentina purchases annually abroad more than 120 million pesos worth of liquid combustibles. In the first nine months of 1941, the country imported 753,341 metric tons of fuel oil; 162,491 tons of diesel oil; 35,181 tons of gas oil; 328,000 tons of crude oil for refining; 634,476 liters of gasoline and other petroleum products; 813,522 tons of coal; 27,207 tons of coke and 1073 tons of lubricating mineral oils. The total value of fuel imports for the first nine months of 1941 was $104,628,596, Argentine currency. The entire previous year's total was $143,245,009.

In 1939 there were 19 oil refineries in Argentina employing 4141 employes who were paid $9,415,000, Argentine currency. The cost of materials consumed added up to $136,121,000 and the value of fuel and lubricants consumed was estimated at $7,747,000.

In 1939 Argentina also refined kerosene, gas oil, diesel oil, fuel oil, lubricating oils, lubricating greases, paraffin, asphalt and asphalt emulsions, coke and insecticides.

A recent report in the *Argentine Bulletin of Petroleum Information* stated that in order to fill its gasoline, kerosene, gas oil, diesel oil and lubricant requirements, Argentina must refine at least 4,000,000 cubic meters of petroleum annually. In 1940 the quantity refined was exactly 3,920,074 metric tons. Of this total, 584,607 metric tons represented petroleum imports. In other words, in 1941, 85.09 per cent was national production and 14.91 per cent was imported.

Lubricants, Fuel Oil and Gas

According to Argentine estimates, national production in 1941 approached the rate of 3,600,000 metric tons a year, equaling 90 per cent of the raw material required for refining carburetants and lubricants in order to meet national consumption requirements and 50 per cent of the total domestic consumption of fuel oil.

Together with the extraction and refining of petroleum, Argentina also produces petroleum gas. There is an estimated consumption of 850,000,000 cubic meters of processed gas whose heat value is estimated at 9500 calories per cubic meter. The production of petroleum gas in 1941 represented 94.12 per cent of that year's total consumption, without having to draw upon natural gas reserves. Exploitation of these reserves is just beginning.

It is estimated that in normal times Argentina, with a population of 13,500,000, consumes 100 liters of gasoline per capita, while the rest of South America, with a population of about 75,000,000, consumes only 16 liters per capita. In other words, Argentina's per capita consumption of gasoline is 6.25 times greater than its neighbors.

The most recent Argentine statistics indicate that in 1941 government petroleum production was already filling 49 per cent of the nation's total requirements.

Argentina produces very little coal and depends almost entirely on imports. These imports were formerly obtained in the most part from England.

In 1937 over 3,000,000 tons of coal were imported. Under present wartime shipping conditions supplies have been severely curtailed, consequently throwing an extra burden on the petroleum industry to provide for the fuel needs of the nation.

Argentine officials have recently arranged with Bolivia for 3000 tons of

(*Please turn to Page* 83)

Many modern structures grace the streets of Argentina, interspersed among the more ornate buildings of past decades. The "Edificio Kavanach", left, is an apartment house in Buenos Aires. At right is the "Obelisk," which stands in the Avenida Nueve de Julio. It rises 220 feet and was built to commemorate the city's founding in 1536

Tin Use Further Reduced; Content In Solder Limited to 20 Per Cent

UNITED STATES tin consumption will be cut another 12,000 to 15,000 tons in 1943 by a new General Preference Order M-43, issued to replace the previous orders M-43 and M-43-a. This new reduction will bring anticipated tin use in 1943 to about one-half 1941 consumption.

Principal additional tin savings will be gained by reducing the tin content of solder from the 30 per cent formerly permitted to 20 per cent. Further savings will come from elimination of exceptions to quota restrictions previously granted to certain rated orders.

The third source of tin savings results from the way the new order is written, listing certain specific uses, the quantities, and the circumstances of use which are permitted, and forbidding all others. This type of order prevents leaks of tin to unforeseen uses. Additional savings will result from permitting the use of pig tin only where the use of secondary tin is not possible. All references to ratings are removed because tin is completely allocated.

In addition to continuing the complete allocation and use control, WPB may now specify the purpose and products for which any person may process tin. Also, no person may accept delivery of any tin if he has more than a practicable minimum working inventory, such inventory in no case to exceed 45 days' supply. The new order removes all distinctions, between pig tin and scrap tin, it having been proved that one material is as satisfactory as another.

Schedule I of the order lists 16 classes of products in which tin may be used, and specifies exactly how much, and under what conditions it may be used. Uses on Schedule I are only those regarded as being absolutely essential. In addition, List A of the order (identical with the prohibited list of the former order) includes 27 classes of products which normally used tin, and for which the use of tin, regardless of form, is now specifically forbidden. A new List B is added, listing uses forbidden except when specifically authorized by WPB. The purpose of this double prohibition is to prevent use of some tin-bearing product permitted in Schedule I, such as solder, for manufacture of items on List A or B.

Reduction of tin content of solder to 20 per cent from the former permissible limit (30 per cent), is based on the experience acquired in the use of low tin substitute solders during 1942. Solders containing far less than 20 per cent tin, with the addition of a small percentage of silver and other elements, have been successfully used for practically every important purpose during that period. As a result of that experience, these mixtures have been recognized in the SAE, the ASTM, the Army, the Navy, and federal emergency alternate specifications. Furthermore, such difficulties as may have resulted from the slightly increased heat required in the application of the solders have been overcome and these mixtures are not in general use.

Six New Claimant Agencies for Critical Materials Established

SIX new "claimant agencies" to present claims for critical materials to WPB have been established. The agencies are being sent invitations to nominate members to represent them on the Requirements Committee.

They include: National Housing Agency, Office of Rubber Director, Office of Defense Transportation, Petroleum Administrator for War, Food Administrator, Facilities Bureau of WPB.

Claimant agencies act as spokesmen for the various "customers" using critical materials. They are responsible for making up and presenting their respective programs and compiling requirements of materials to meet them. This is being done both for current requirements and for future requirements to be submitted under the Controlled Materials Plan, which is effective April 1.

For instance, the National Housing Agency draws up the war housing program and estimates the amount of critical materials required to put it into effect. The request for materials to meet this program is then studied by the Requirements Committee in relation to requests of al lother claimants.

Each claimant acts as proponent of its own program and carefully examines the programs of others. In this way views of all interested parties are expressed. After full discussion of the programs and requests of the respective claimants, the chairman of the Requirements Committee, with the advice of the Committee, makes allotments of materials to meet definite approved programs.

If adjustments in individual programs are necessary as a result of the final allotment, the claimant is responsible for making them. The claimant is also responsible for seeing that the approved program is carried out.

The original claimant agencies were the Army, Navy, Air Forces, Maritime Commission, Office of Civilian Supply, lend-lease and Board of Economic Warfare.

Revised Class B Products List Sent to Manufacturers

Revised official Class B products list of the Controlled Materials Plan is being distributed by WPB. List includes about 500 groups of items and will be used by manufacturers to determine whether they are Class A or Class B producers.

WPB also has sent to Class B manufacturers copies of Form CMP-4B, to be used in making application for allotments of controlled materials required during the second quarter in making Class B products, as well as copies of Form CMP-4A.

Manufacturers of Class A products which are sold for use as repair parts are required to make separate application on CMP-4B to WPB.

Applications by Class B manufacturers on CMP-4B must be filed with WPB by Feb. 9 for second quarter. WPB admits this gives little time for the filing of applications but asked for the closest co-operation of all prime and secondary consumers in meeting the Feb. 9 deadline. It also urged Class B manufacturers to make certain that their applications covering each Class B product includes all controlled materials required by them and by secondary consumers supplying them with Class A components.

Period during which Metals Reserve Co. will pay premiums on over-quota production of domestic copper, lead and zinc has been extended until July 31, 1945, to aid in insuring maximum production of these metals for use in the war effort. Metals Reserve Co. retains the right to terminate the premium payment program, should the war come to an end before July 31, 1945.

One Worker in Three at War Task; Munitions Exceed Objectives

TORONTO, ONT.

WAR industries now engage the efforts of approximately 1,000,000 persons, about one-third of the industrial population, C. D. Howe, minister of munitions and supply, states in a current report. Since the beginning of 1942 about 28,000 persons monthly have been absorbed into industry. The aircraft industry employs 55,000, and this number may be doubled in 1943. Airplane production already has supplied thousands of planes and for the current year output is expected to reach a value of $1,000,000,000.

Adaptation of Canadian shops to production of heavy munitions has been on a scale far beyond the highest objective set a year or more ago, Mr. Howe reports. Monthly shell production now is measured in millions and practically doubles the output of a year ago. In the former war empty shells were sent overseas to be filled but now explosives are supplied and the shells are shipped as complete ammunition. While 500 men once were employed in one ammunition plant now 30,000 men, women and girls are making ammunition in two government-owned arsenals and many other plants.

The government has built more than 300 plants producing chemicals and explosives of which more than half are considered major projects, costing $1,000,000 to $19,000,000. More army rifles are produced in one week than in all 1941. Production schedules are being exceeded every week. The army rifle is being manufactured by Small Arms Ltd., a government-owned industry whose plant has expanded six times the original size.

Ordnance production now includes 12 types of guns and 16 types of carriages and mountings. These include 25-pounder field pieces, two heavy antiaircraft guns, four naval guns, two tank guns, two antitank guns and a third type of antiaircraft gun barrel. Several types of rifles, submachine guns and secret weapons are also in production.

Conservation of materials and manpower are being made by redesigned ammunition packaging, savings being estimated at $4,500,000 and thousands of man-hours.

Containers for fuses, primers and other shell parts, formerly made of soldered tin plate, have been converted to fiber, terneplate and enameled black iron. This saves 3,500,000 pounds of tin plate per year.

During 1942 the New Helen iron mine, controlled by Algoma Ore Properties Ltd., a subsidiary of Algoma Steel Corp. Ltd., Sault Ste. Marie, Ont., produced and shipped 472,000 tons of sinter ore. Rated capacity of the mine at the middle of 1940 when production was started, was 300,000 tons per year. About 200,000 tons is consumed by Algoma Steel Corp. and the remainder exported to the United States.

Steep Rock Iron Mines Ltd., 25 King street West, Toronto, Ont., D. H. Hogarth, president, is preparing to develop its property in the Atikokan district of Ontario. A contract has been given to C. A. Pitts General Contractors Ltd., 34 King street, for road improvements, a bridge across the narrows of Steel Rock lake and buildings in connection with river diversion and lake de-watering. Sudbury Diamond Drilling Co., 67 Yonge street, has a contract for winter diamond drilling.

—o—

SEARCH FOR TUNGSTEN

GOLD mining being "out for the duration," Canadian prospectors in MacKenzie river basin, north of Alberta, are searching for scheelite, ore which yields tungsten, now used in armor-piercing bullets for antitank guns. Half the prewar supply of tungsten came from China, Thailand and Burma. Vast new deposits are being uncovered in Canada through aid of ultra-violet rays, which cause tungsten ore to fluoresce. Two prospectors (above) pulverize rock samples before panning. Ore is bagged for shipment (below) to refineries. In World War I tungsten ore rose to $93 per net ton. Currently it is about $26. NEA photo

Again, THANKS *Industry*

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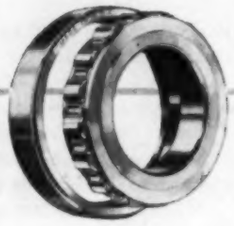

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Therefore, for giving us a golden opportunity in our golden year, again we say THANKS, INDUSTRY.

Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

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INDUSTRY AND HYATT PARTNERS IN MECHANICAL PROGRESS

HYATT ROLLER BEARINGS

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Annual S.A.E. shindig sprinkled with olive drab and well soaked with sealing compound of censorship. . . Ford gets another $100,000,000 for ordnance products

DETROIT

FOG of military censorship hung thick over the technical sessions at the Society of Automotive Engineers' War Engineering Production meeting here last week. Of the 37 papers scheduled for presentation, one was completely withdrawn by the Ordnance Department—a discussion of the manufacture of 75-millimeter steel cartridge cases by R. B. Schenck, Buick metallurgist. All other papers had been cleared—"co-ordinated" seems to be the military term—by the proper service branch. Those participating in discussions were warned to steer clear of certain types of comment, such as production rates, performance figures, etc., and this dried up the discussion periods to inconsequentials.

In the meeting rooms, after the formal presentation of papers, large signs were shown, reading about as follows: WARNING! ALL DISCUSSION NOW GOING ON IS OFF THE RECORD AND MUST NOT BE REPORTED. All meetings were liberally sprinkled with Army and Navy uniforms, ranging through the full category of commissioned ranks. Even in private discussions there appeared to be an uneasiness over detailed analysis of manufacturing problems.

Nonetheless the meeting was considered to be the usual success. Hotels were sold out. Meetings were well attended. The customary formal functions were run off with all the usual splendor and finesse. Private parlors maintained by a score or more of companies were smoke-filled and bustling as in other years. Unimportant but a sign of the times was one complaint voiced over the inability to obtain a supply of sugar from a hotel kitchen with which to set off a batch of old-fashioned cocktails.

Last-minute withdrawal of Mr. Schenck's paper on steel shell cases was a surprise to many, as well as disappointment, but Lieut.-Col. H. R. Turner of the Ordnance Department, heading the industry Steel Cartridge Case Committee, presented a generalized review of the entire steel shell case picture, which is printed elsewhere in this issue. Colonel Turner indicated that the reason for the secrecy maintained on discussion of these steel cases is the conviction of Ordnance officers that this country is far ahead of Germany in the development, in spite of the fact that the Germans have been making steel cases ever since the first World war, while in this country the work has been in process for only 18 months.

Brief excerpts from some of the technical papers of particular interest to readers of STEEL follow:

Shell Metallurgy Specifications

By Col. H. H. Zornig, Ordnance Dept.

Centering attention on the high-explosive type of shell, Colonel Zornig pointed out that the tonnage of steel required for manufacture of this type of shell to be fired from rifled weapons larger than 40-mm. caliber is so great that the inclusion in its composition of any alloying elements other than residuals and a little manganese (up to 1 per cent) cannot be tolerated. This limits minimum physical properties that can be specified to those that can be obtained from such a steel in which the carbon content is limited to not over 0.60 or 0.65 per cent in order to make it reasonably easy to handle in manufacturing. Walls and base then must be made thick enough to prevent the unit stresses produced in them by the forces due to firing from exceeding the specified minimum physical properties, less a factor of safety.

On the matter of high-sulphur steel for good machinability, Colonel Zornig said he saw no reason why satisfactory H.E. shell bodies could not be made from forgings with sulphur 0.12-0.15 per cent, but that the disadvantages from a steelmaking standpoint of such a steel outweigh the advantages, so sulphur content is limited to a maximum of 0.055 per cent.

Desired uniformity in physical properties is obtained by prescribing that

NEW OFFICERS ELECTED BY AUTOMOTIVE ENGINEERS

Mac Short, vice president, Vega Aircraft Corp., Burbank, Calif., whose vocation is aeronautical engineering and whose avocation is designing and flying planes, is the thirty-eighth president of the Society of Automotive Engineers, taking office at the close of the annual meeting last week in Detroit. He succeeds A. W. Herrington, chairman Marmon-Herrington Co., Indianapolis.

Since 1927 Mr. Short has devoted his attention to the design and manufacturing phases of aviation. He was instrumental in forming the Stearman Aircraft Co., Wichita, Kans., and for ten years was vice-president and chief engineer. In 1937 he organized and became president of Vega, relinquishing administrative duties in 1940 to devote his full time to aeronautical engineering and to further the development of Vega-designed aircraft.

David Beecroft, Bendix Aviation Corp., New York, was re-elected treasurer of the S.A.E.

New vice-presidents for 1943 are: *Aircraft*, John G. Lee assistant director of research, United Aircraft Corp., East Hartford, Conn.; *Aircraft-Engine*, S. K. Hoffman, chief engineer, Aviation Corp., Williamsport, Pa.; *Diesel-Engine*, Grover C. Wilson, fuel research engineer, Universal Oil Products Co., Chicago; *Fuels & Lubricants*, W. M. Holaday, automotive research engineer, Socony-Vacuum Oil Co. Inc., New York; *Passenger-Car*, R. E. Cole, vice-president for engineering, Studebaker Corp., South Bend, Ind.; *Passenger-Car-Body*, G. J. Monfort, engineer, Chrysler Corp., Detroit; *Production*, Arnold Lenz, assistant manufacturing manager, Chevrolet Motor Division, Detroit; *Tractor & Farm Machinery*, C. G. Krieger, agricultural engineer, Ethyl Gasoline Corp., Detroit; *Transportation & Maintenance*, Austin M. Wolf, automotive consultant, New York; and *Truck & Bus*, E. W. Allen, coach engineer, Yellow Truck & Coach Mfg. Co., General Motors subsidiary, Pontiac, Mich.

MAC SHORT

Three new members for the 1943-44 term were elected to the S.A.E. Council: N. P. Petersen, president, Canadian Acme Screw & Gear Ltd., Toronto, Ont.; C. G. A. Rosen, director of research, Caterpillar Tractor Co., Peoria, Ill.; and J. C. Zeder, chief engineer, Chrysler Corp., Detroit.

after the last operation which produces any plastic deformation of the metal, the shell bodies will be subjected to a heat treatment comprising a quench in oil from a temperature above the critical followed by a draw at not less than 750 degrees Cent.

The speaker said that the Ordnance Department as yet does not foresee a demand for the low-capacity high-explosive shell, but that one type had been designed and a few thousand of the shells had been produced. Body of this shell is machined from a heat-treated cast steel blank.

Shell Manufacture

By C. L. Eksergian, Budd Wheel Co.

Classifying shells into three types—smooth-bore mortar, high-explosive rifle bore and armor-piercing shot, Mr. Eksergian noted that physical requirements for the smooth-bore type can be met satisfactorily without heat treatment, so the problems of manufacture are largely ones of fabrication. Originally the H.E. rifle-bore shell was in the same classification but because of a change in chemistry and higher physical demands incident thereto, heat treatment was required. Despite the addition of heat treatment, physical requirements were not raised appreciably, the problem here also being fabrication.

In the case of the A.P. shot, however, physical requirements are most exacting, and the only dependable yardstick is the ultimate firing test. This is traceable to the speculation which exists on the relevancy of laboratory tests in indicating successful plate penetration, a situation due in part to the absence of a complete understanding defining the properties requisite to ballistic requirements. For example, it was found that not only is nose hardness a factor, but of equal importance in determining the suitability in firing tests is the uniformity of depth of hardness.

Discussing forging and machining practice, the speaker said that marked progress has been made in reducing forging weights, and by keeping forging and machining operations under one roof, so to speak, a saving of over 35,000 tons of steel on issued contracts has been made. Headers have now been accepted as recognized shell forging equipment, and are being used even on such large sizes as 155-millimeter.

Mr. Eksergian recalled that in starting production on a 90-millimeter shell by the upset method, only 50 forgings could be made before punch replacement was necessary. By opening the clearance a relatively few thousandths of an inch, the punch life jumped from 50 to 10,000 forgings, and it is now common to obtain a punch life of 25,000 pieces. While chemistry and heat treatment of punches and dies are important, of equal concern is the die coating. In this connection, a graphite emulsion of heavy refinery black oil has been used with success.

Materials in Bofors Gun

By M. F. Garwood and E. H. Stilwill, Chrysler Corp.

Initial tests of the Bofors 40-millimeter gun showed that steels covered by S.A.E. specifications would suffice for most parts, but the development of special testing machinery simulating service requirements later indicated the weapon could be made from the new N.E. steels. Difficulty was encountered in making the gun forecasing from steel castings which were not available in quantity, so engineers developed a method of making the part from ½-inch S.A.E. 1025 steel plate, blanked, formed, welded into a tube and then welded to the gun.

Other substitutions which served actually to improve the Swedish prototype were the use of cast copper-silicon bronze to save tin in making bushings and bearings, and metal spraying of brass for bearing members to reduce consumption of more critical metals.

Specifying Gun Finishes

By H. S. White, Oldsmobile Division, Lansing, Mich,

With 120 separate gun parts being subcontracted to some 50 different companies, the matter of uniform finish specifications was an important one, so Olds engineers devised a standard set of reference bars, each of which showed the group of six minimum finishes acceptable to the Ordnance Department—ranging from coarse machine finish to a lapped finish. These were supplied to subcontractors along with actual photographs of parts being produced, the latter being cross-hatched in standard designs on various surfaces to show the finish required.

While this system has no official standing, it has proved to be ideal for promoting mutual understanding between Oldsmobile and subcontractors, and also has provided efficient control of parts and operations.

Substitute Materials

By John G. Wood and R. F. Sanders, Chevrolet Motor Division

Engineering records show that in a typical production military vehicle, a 4x4 truck of 1½-ton size, 107 items of rubber have been substituted by less critical materials; 129 items of copper or copper-base alloys have been substituted by lead, felt, steel, powdered iron, die castings, malleable iron, granodizing, cadmium plate, zinc plate, terne plate, cactus fiber, etc.; 57 items of tin and tin-base alloys have been replaced

(*Please turn to Page* 45)

MOBILE GAGE—CHECKING EQUIPMENT SAVES MANY MAN-HOURS

ESTIMATED saving of better than 1000 man-hours daily is achieved at a Nash-Kelvinator Corp. plant by use of these special trucks carrying gage-checking equipment. Five such trucks are in operation over three shifts, 24 hours a day, covering production and inspection departments, permitting production gages to be checked at the point of use and eliminating the need for bringing gages to a central checking station.

This plant has an estimated 35,000 gages in 5400 types, of which checking equipment handles about 7000 daily. Each truck, designed by the Lansing Co., carries the following equipment; Swedish gage amplifier, Federal dial indicator; 12 x 12-inch surface plate; set of master gage blocks; set of depth micrometers; two sets parallels; steel square; hardened and ground V-block; two test bars for setting; height gage, 10-inch size; set of 1 to 12-inch micrometers; and miscellaneous accessories such as hones, sealing wax, alcohol torch and the like

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Simply return them to us for ***complete*** reconditioning. This Apex service restores your bits to their original utility, good as new in every respect. Yet it costs only a fraction of the price of new bits.

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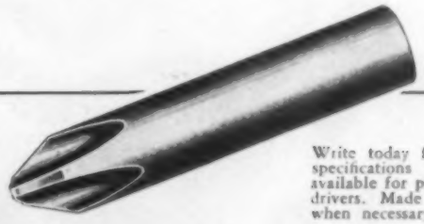

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"More lives than a cat."

APEX

THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Manufacturers of power bits for Phillips, Slotted Head, and Clutch Head screws; and hand tools for Phillips and Clutch Head screws.

Phillips Bit Reconditioning Service for the Pacific Coast at the Burklyn Co., 3429 Glendale Blvd., Los Angeles, Calif.

WING TIPS

Flying Fortress engineers come up with 100,000 special tools to facilitate fabrication and assembly operations. . . Take change orders in stride. . . Triple output in year

URGENT demands for greater speed and more production of aircraft, unrelenting throughout 1942, challenged the inventive genius and mechanical skill of the tooling department of Boeing Aircraft Co., Seattle. In three years this efficient and well organized department has designed and built more than 100,000 special tools of all kinds and classifications. The company's extensive tooling program in the last year formed the basis for increased production of Boeing B-17 Flying Fortresses, now rated as one of the most effective bombers in the war.

Most of these tools or production aids have been developed within the last 18 months. In former days when the Army Air Corps considered 39 Flying Fortresses during a year an important order, extensive tooling, such as is now current, was neither economical nor practical. Tooling on a large scale followed quantity production. Efficiency of these tools has helped to step up production schedules so that planes are now being delivered more than three times as rapidly as they were prior to Pearl Harbor.

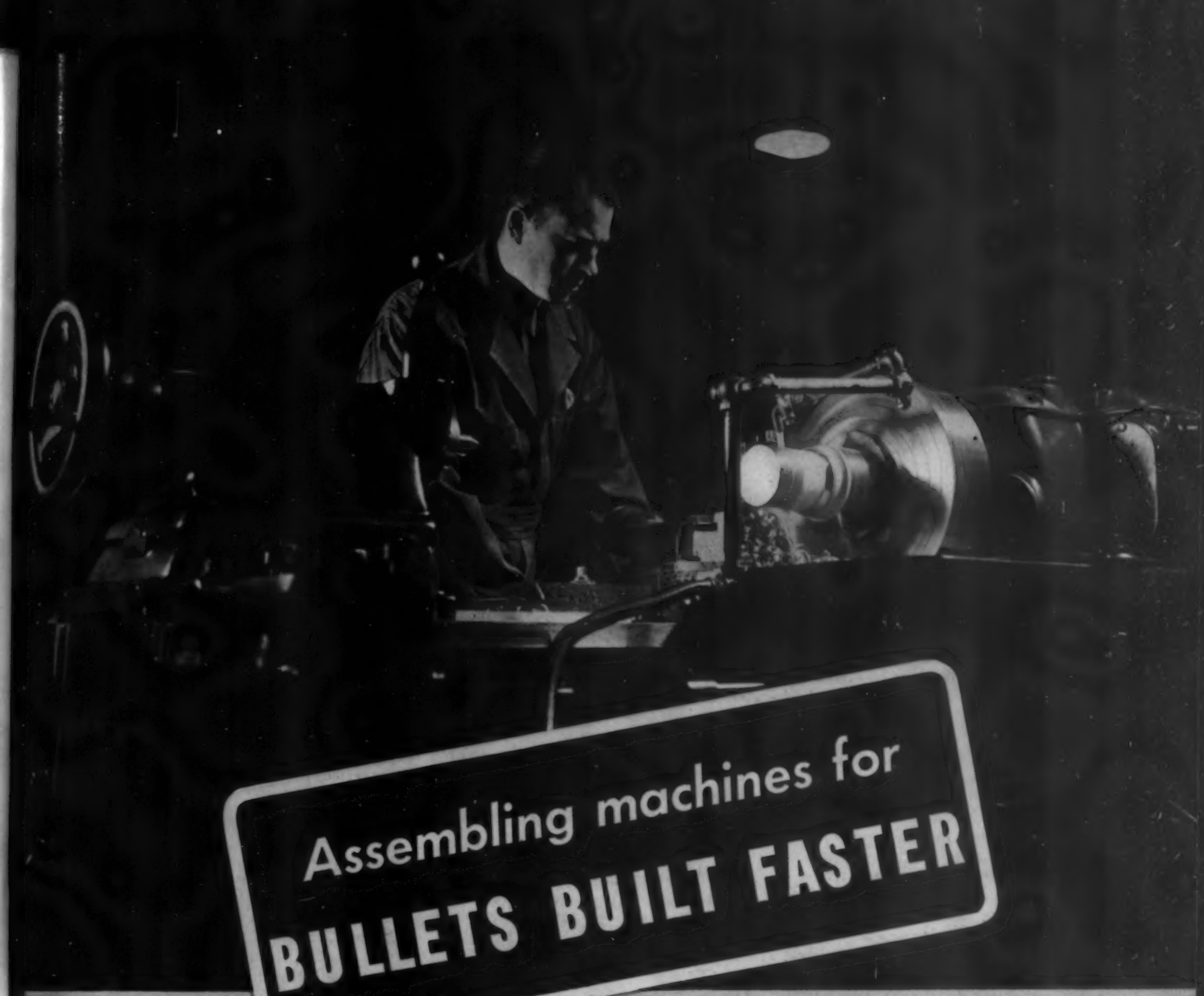
The Boeing organization considers a tool is any device used either by hand or mechanically to fabricate, assemble, install or handle a part. Boeing-developed tools have contributed in a major way to the reduction by better than 50 per cent, in the last year, in the number of man hours required to build a Flying Fortress. However, more important than the saving of labor in this period of haste and more haste, was the saving of elapsed time. Every hour gained in production is another hour's advantage over the enemy.

Ordinarily one would not look for artists in the tooling department yet there are more in tooling than in any other department except engineering. The reason is that production illustrations, being an aid to production, are classified with tools. Technically trained artists make these drawings and aside from showing a part in perspective, they illustrate the proper sequence of operations so that shop employes will know how to perform their jobs without taking the time to read a complicated blueprint.

One way in which the organization of Boeing's tooling department differs from that of most other aircraft manufacturers is that Boeing has tool engineers working in close co-operation with aeronautical design engineers. In this way the tooling men can influence the design of an aircraft and its parts toward the more efficient way to manufacture it. Consequently dies, jigs, fixtures and practically every aid to production found in the plants has been designed by tool engineers and built by tool fabricators.

In many respects tooling is inventing. Because in former days it was not possible to tool extensively, there were no commercial companies engaged in manufacturing tools specifically for the construction of Flying Fortresses. That is another reason why so many of the tools now in use have been built by Boeing employes or designed by company engineers and farmed out to commercial toolmakers to manufacture. But while the devising of tools to per-

Left, tool engineers check master jig gage against a master control gage, providing double check on accuracy of jig alignment. Right, specially designed scaffolding and ladders permit workmen to operate on several levels while swinging fin and rudder sections into position on a Flying Fortress. Ladders extending down the dorsal fin can be folded out of the way while overhead crane moves this fin section into place



Assembling machines for BULLETS BUILT FASTER

SUNOCO EMULSIFYING CUTTING OIL

"helps machine manufacturer prolong tool life by 40%"

Bullet assembling machines are the wartime specialty of this machine tool manufacturer . . . and one factor that's contributing to their high production quota is Sunoco Emulsifying Cutting Oil.

Before changing to Sunoco, excessive heat made necessary low machine speeds. Production was limited . . . tool life poor. At the recommendation of a Sun Doctor of Industry—a metal working expert—the change in cutting oil was made. Improvement was immediate. Tool life increased 40%. Sunoco's exceptional heat absorbing qualities permitted high speeds . . . production was increased 40% and the finish of parts was noticeably better.

This is one example among many where Sunoco Emulsifying Cutting Oil is helping American industry turn out a flood of better war materials—faster. Call in a Sun Oil Company Engineer. Let him show you the value of Sunoco as an aid to increased production in your own plant. He stands ready . . . willing . . . and able to serve you.

For case histories of how he has helped others, write for your copy of "Helping Industry Help America."

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SUNOCO

SUN PETROLEUM PRODUCTS *HELPING INDUSTRY HELP AMERICA*

Guide wheel on milling cutter shaft follows contoured template, permitting inexperienced woman operator to handle contourmilling machine. Air hose blows chips away from template which is held against guide wheel by heavy spring

form jobs which hitherto had been done by hand may constitute inventing, the tooling man looks upon that factor as just part of the job. He still prefers to be known as a tool engineer.

In producing military aircraft during wartime, one of the manufacturer's major difficulties is the continuous change orders requested by the air services. Lessons learned in actual combat operations must be incorporated into the fighting machine as quickly as possible in order to keep war equipment in advance of that of the enemy. Much of the change order load falls on the tooling department and because of its flexible organizational scheme, such orders can be built into an airplane within a brief period. In fact, the department can prophesy the particular serial number of a Flying Fortress yet to be produced, upon which the first of a design change will be incorporated and—in a minimum time, without any delay in the schedule—see the designated unit come off the line with the changes built into the plane.

The 100,000 figure does not include standard types of tools purchased, such as electric motors, drill motors, pneumatic hammers, riveting machines, die sets, etc. Including these, the total of all kinds of tools required would be almost double.

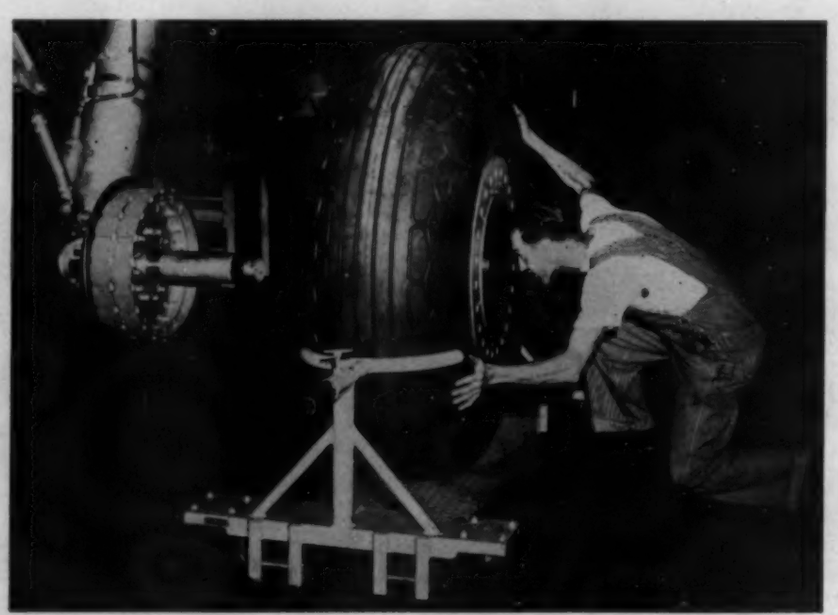
The largest of the tools made by Boeing are the three-story high wing jigs. More impressive than the size of the jigs, however, is the fact that these appliances contain ample working space for large crew of workers on each floor, with plenty of light and ventilation for the personnel. The jigs can be partially dismantled to remove the completed wing and reset in a brief time. Adjustments on the jigs enable inspectors to check their accuracy to limits of 0.0005-inch.

Boeing's tooling department is so organized that it can have a new die in operation within two weeks of receipt of a change request. About half this time, or one week, is required for the designing of the die, the other week for making it. Many of these dies are Kirksite, a zinc-base alloy melted in the plant foundry and cast. First a plaster and wood "mockup" of the die is made, to shrink scale. (Kirksite shrinks ⅛-inch to the foot). A plaster mold is made from the mockup, the mold is covered with a lacquer, a plaster pattern made from the mold, the pattern goes into the foundry, is packed in casting sand, the pattern removed, and the die is cast. When cool, the die needs a little polishing to remove the rough marks of the sand, and is ready for use after being checked for accuracy. This die process is particularly adapted to the aircraft industry as seldom is it necessary to make more than 10,000 parts from a single die.

Die Eliminates 26 Parts

Exactly how this method works is evidenced by the tail gunner's door. The door to the rear gunner's compartment of the Flying Fortress as it was first built, required a jig, and over thirty parts, which were assembled by riveting and spot welding. When a die for a draw and form operation was made for this job, 26 parts were eliminated, along with numerous rivets and, more important, a considerable saving in time was effected, by not having to assemble the door.

The change of the rear gunner's door was a Boeing design change. Such changes are made frequently whenever they can produce a substantial saving of time in the manufacturing process. Many design changes are requested by the Army Air Forces who, as operators of the plane, desire an addition to the ship providing better protection, or making it a more potent weapon.



Although this Fortress wheel assembly weighs 500 pounds, one man can easily assemble it to landing gear hub, by use of this specially built wheel dolly. Note unusual design of brake shoe required to slow these air giants when landing

Engineers' Meeting Reviews War Production Progress

(*Concluded from Page 40*)

similarly, as well as 60 items of nickel and chromium alloys.

In answer to the question, "Have we gone the limit in substitutions?" the authors state emphatically, "No," and add that progress from this point on will depend entirely upon the supply of materials. If still lower grade materials are necessary in future war products, then means will be found to adapt them. If, in the case of steels, we reach the point where no alloys are available, then a lot of redesigning of parts will be necessary and interchangeability may be sacrificed in some instances.

Tool Shop Organization

By W. F. Pioch, Ford Motor Co.

Reviewing facilities and equipment of the extensive Ford tool and die shop, the speaker pointed out that when completed in 1938 it was considered one of the finest tool shops in the world, with main floor area of 367,000 square feet, and balconies on both sides with an additional 48,000 square feet.

No hand hoists are used in any part of the shop. Instead, all lifting is done by electric hoists, traveling hoists and the main cranes. Three 50-ton traveling cranes, with a 20-ton auxiliary in the main bay, eight 10-ton traveling cranes in the adjacent bays with two 20-ton and three 10-ton transfer cranes and about 80 electric hoists are used in the building. Should it become necessary to handle a load larger than 50 tons, an equalizer bar is attached to two of the 50-ton cranes, thereby accommodating up to 100-ton loads.

In the grinding department, on all machines that do dry grinding, the abrasives are exhausted direct from the grinding wheel through a small duct and delivered underground to a main. This transfers them to a duct on the outside wall and then to the dust collectors on the roof of the building.

The building is divided into three principal departments—dies, small tools and gages, and machine repair and special machines. Three main factors are emphasized as contributing to efficient operations: An interlocking monorail and crane system; 25-foot traffic aisles for the transverse travel of materials; and a central 10-foot safety traffic aisle.

Body Plant Goes to War

By L. B. Rivard, Lincoln Division, Ford Motor Co.

Within six weeks after original notice of contract for army "jeeps," bodies were being shipped from this automobile plant, marking one of the quickest changeovers on record. In this interval was a frenzied period in which assembly lines of other plants producing these bodies were photographed and measured to obtain data on fixtures, platforms and other structures—a so-called form of "barnyard engineering" seldom used these days but necessary because of lack of drawings or blueprints.

When the jeep bodies began to roll, they were intermingled with passenger car bodies on a line transferring them to paint ovens. By the time the first jeep cleared the ovens and finish paint line, the final assembly line was ready to operate with its stock of accessories and manpower in place.

Aircraft Engine Materials

By Mel Young and H. H. Hanink, Wright Aeronautical Corp.

Selected compositions of the N.E. steels, now incorporated in S.A.E. Aircraft Materials Specifications and designated as alternates, should prove in all respects equal, and in some cases superior to the steels now used in aircraft engines. Required compositions will be fewer in number, permitting a welcome housecleaning of carryover and unnecessary compositions.

Ford Awarded Huge Contracts To Build Tanks, Gun-Mounts

Ford has announced receipt of two new Ordnance contracts, one for tanks and the other for gun mounts, totaling more than $100,000,000. It is reported the gun mounts are to be shipped to Chicago plants for assembly, while the tanks are being built at the Ford plant here. Ford also recently received DPC funds for remodeling and re-equipping a Chicago assembly plant to undertake assembly of armored cars. No further details have been released.

Women are now employed in the chemical and metallurgical departments at Ford, working at conventional chemical benches, in the spectrochemical laboratory, as X-ray technicians and in the metallurgical examination of metals under the microscope.

First M-4 medium tank to be assembled by students at the Chrysler-directed Detroit Ordnance School was completed about ten days ago. Parts and subassemblies were made in various Chrysler plants. A corporation instructor and 12 student-soldiers assembled it in eight days. Better than 200 men are now being trained for tank maintenance in the school.

Co-operating with the Tank-Automotive Center of the Ordnance Department in the standardizing of military vehicle parts (Mirrors of Motordom, Jan. 11), the Automotive Council for War Production has named a governing board of its military replacement parts division to cooperate with Ordnance officers and to direct activities in three separate fields of tank, combat car and military truck parts production and supply.

John W. Anderson, president of the Anderson Co., Gary, Ind., is chairman of the new board. Other members include K. J. Ammerman, Borg-Warner Corp.; F. C. Bahr, Chrysler; A. S. Bonner, Clark Equipment Co.; M. D. Douglas, General Motors; R. M. Fox, Pullman-Standard; G. H. Froebel, Baldwin Locomotive; R. E. Hamilton, Automotive Gear Works; T. C. Huxley, Diamond T Motor Car Co.; H. W. Knapp, McQuay-Norris; R. F. Koch, International Harvester; W. L. Lentz, American Locomotive; V. J. Lowenstein, Carter Carburetor; F. W. Parker, Timken-Detroit Axle; J. A. Shank, Electric Auto-Lite; W. L. Stancliff, American Car & Foundry; C. J. Reese, Continental Motors, and R. I. Foberge, Ford.

Steps Up Steel Propeller Blade Production

American Propeller Corp., Toledo, O., will increase present plant capacity by 50 per cent with the purchase of additional machinery and equipment, it has been announced by William F. Wise, president, and executive vice president of the Aviation Corp.

Production of steel propeller blades, used on bombers of the Army Air Forces, has increased consistently every month since the plant was completed last summer and shipments are now approximately two months ahead of contract schedules. Production for December was 40 per cent greater than for November.

The hollow steel blades are made from a single piece of chromium-nickel-molybdenum seamless steel tubing, and have high resistance to corrosion and abrasion.

Texas Aircraft Plant Expands; Add Fighters, Bombers to Line

Fighters and bombers, as well as trainers, are now included in the production program for the Dallas Division of North American Aviation Inc., according to J. H. Kindelberger, president of the company. He added that two years after the start of construction of the Texas division a second large plant has been completed and tens of thousands of new workers will be needed in the two plants this year.

First production at the Dallas plant was concentrated on AT-6 combat trainer planes.

Wartime Developments To Have Far-Reaching Influence on Future Deep-Drawing Practice

By LIEUT.-COL. H. R. TURNER
Ordnance Department, Cincinnati

MANUFACTURE of steel cartridge cases successfully in a number of plants in the country is evidence again of the ability of American industry to do that which for years has been termed "the job that can't be done." Before discussing some of the problems and their solutions in connection with this great development, it would be well to outline the historical background of cartridge cases, both brass and steel, so that a complete understanding of the problem may be had.

Cartridge cases have traditionally been made from brass. This is readily understandable when we remember that brass was a metal well understood, made in quantities, and a metal the workability of which was well known. So, when cartridge cases were required, it was natural that the designer turned to brass as the medium for the production of the item. In those days, the art of making steel was in its infancy; comparatively little was known about it. The Bessemer process and the open-hearth process of making steel were not yet developed. As a matter of fact, were it not for the tremendous advances in the art of steelmaking brought about by the extraordinary demands of the automotive industry, even today it is questionable whether or not steel would be available from which cartridge cases could be made.

Supply Appeared Adequate

We should further remember that while the record indicates from time to time that attempts have been made to produce cartridge cases from steel and incidentally with some success, there was no great need for producing steel cartridge cases and, in fact, there appeared to be no possibility of a shortage of the basic materials which go into the production of brass.

It is to be remembered that at the time of World War I, cartridge cases were produced in quantities far in excess of the necessities and at no time did any shortages appear in copper or zinc. So through the years of peace from 1918 to 1937, no serious consideration was given to the problem of conversion of cartridge cases to steel for we lived in the belief that if cartridge cases were ever required, there would be no trouble in getting them.

It was only about 18 months ago that certain high officials in the army and other agencies in Washington became aware of the possibility of a serious shortage of copper and, with that possibility looming on the horizon, the Army Ordnance Department immediately plunged into a thorough analysis of the places where brass might be eliminated by substitution and, because of that analysis, qickly gave consideration to cartridge case brass because the consumption for cartridge cases was tremendous. The Ordnance Department had no illusions that the accomplishment of the conversion of cartridge cases from brass to steel was an easy task. Analysis of the experiments and work done in this field indicated an extremely difficult task. It indicated a task to be done by American industry. It must be directed by Ordnance officers because they were professionally qualified to pass on the difficult functional requirements of the finished product.

Abstracted extensively from a paper presented at the War Engineering Production meeting of the Society of Automotive Engineers last week in Detroit.

Early research into past experience in the manufacture of steel cartridge cases brought to light the fact that there were two distinctly different lines of approach. The first involved the manufacture of the steel cartridge case from a single piece. The second involved the manufacture of the cartridge case from a multiplicity of pieces. Since the first method was the one finally selected for production, this discussion will cover that method rather fully. However, it is in order to discuss briefly the composite cases.

Many engineers have at one time or another attempted to fabricate steel cases by the assembly of various elements. Activity in this direction was undoubtedly a result of a deep-seated opinion that the draw job was too difficult to be successful when the case was made from one piece. This opinion undoubtedly arose from the fact there is such a wide difference in the weight of metal in the base and side walls in the cartridge case. The methods attempted were many. Some attempted the assembly of a brass cylindrical section to a steel head. This assembly was accomplished by riveting a cylindrical element in the base or by attaching the two elements with hollow bolts and on some occasions by attempting to hold the brass wall to the steel base by inserting the end of the cylinder into a complicated form of annular groove and fastening by brazing or by deforming one wall of the groove. Many methods contemplated attaching a steel cylinder to a steel base by welding, by brazing, and by complicated lock-joints, which in some cases depended entirely on a mechanical joining. All these processes presented extreme difficulty of use in production since each required large quantities of new machine tools and similar facilities. Other factors that weighed in the decision against multiple-part cases were the procurement of great quantities of drawn or welded tubing and the evident necessity of heat treatment to gain the necessary physical requirements.

There is no question that given time, money, and the necessary facilities, multi-part cartridge cases could be built which would equal, functionally, those made in one piece, but while the money was available the facilities were almost impossible of procurement and no long time could be tolerated in such a program.

Selected Fastest Process

This method of production was not passed over lightly, but only as a result of careful and deliberate study.

On reaching the decision that steel cartridge cases were to be made from one piece, the problem was to determine what process would accomplish the results most readily. It is interesting to note that in all the process now being used in production there is a great similarity. It will be noted from the following discussion that the manufacture of the cartridge case divides itself into three major phases. The first is the production of a cup. It is in this phase only that there is any dissimilarity in the methods in use. The second phase involves deep-drawing to obtain the necessary physical properties by cold work. The third phase is heading, and this operation produces the necessary conforma-

tion of the head and here again the process is essentially identical in all the different manufacturing plants.

Since this was a job to be done by deep drawing, it was only natural that the Ordnance Department searched about within the automotive industry to find a company or a man with a wealth of experience in the deep drawing of steel. As a result of this search, it was found the Corcoran-Brown Lamp Division of the Electric Auto-Lite Co. had done remarkable work in deep drawing steel cylinders of extremely high accuracy and that there were in the employ of Corcoran-Brown several men who were recognized as experts in the art of deep drawing metal. These men were invited to Frankford Arsenal and the problem submitted to them.

Immediate reactions were not too favorable, for the shape of a cartridge case is complicated, the sections are not uniform and the changes of sections are abrupt and the most extreme accuracy was required. Nevertheless, the task was undertaken and cartridge cases were drawn using the conventional type of deep-drawing steel. These cases were a fine example of the deep drawing of steel. The conformation was accurate, the dimensions were correct, there was only one difficulty. When the cases were fired, they stuck in the guns so rigidly as to seem almost a part of the gun. However, it was established that a cartridge case could be made of steel of deep drawing quality. It remained then to determine what physical requirements were necessary to make a steel cartridge case completely satisfactory. And it is the development of processes which produced the required physical characteristics that have occupied all the time of a great number of people for over a year. This time was not misspent for there are now a number of manufacturers producing completely satisfactory steel cartridge cases.

Many Firms Helped

It would be well at this time to digress for a moment and discuss briefly a small quantity of steel cartridge cases which were produced by the American Fork & Hoe Co. at Cleveland several months prior to the initiation of the development under current discussion. These cases were made by a process first requiring high grade alloy steel, utilizing forging as a preliminary operation, and then cold working to establish conformation. The final physical condition was accomplished by heat treating methods and at the end of the development, the American Fork & Hoe Co. advised the Ordnance Department that here was a process that would make cases but that it was expensive, somewhat difficult and would entail tremendous investments in equipment to put it into production. And at that time, the suggestion was made that the automotive industry could contribute largely to the task.

Returning now to the discussion of the work at Corcoran-Brown, having made the original cases as to form, they brought into the picture the American Rolling Mill Co., Middletown, O., which made a multitude of small heats of steel of various analyses to search out that steel which would do the job. Certain limitations had been put upon the program concerning the type of steel that could be used. The alloying elements were all scarce and the use of nickel, chromium, tungsten and molybdenum was denied. It was even requested that the minimum amount of manganese be used. Obviously, these restrictions did not simplify the problem. However, steel was produced which was found to be satisfactory, steel which was simple in its chemistry and which it appeared could be produced with comparative ease. At this stage in the development, it was evident the problem could be solved and at this time the Ordnance Department invited into the program some 70 different manufacturers, and awarded experimental contracts for the purpose of finding out how to make these cases.

It is only fair to say at this point that from every one of the 70 companies which participated in the development, some information of value was obtained and the current practices in the manufacture of steel cartridge cases represent not the efforts of any single company but the composite results of the work of all.

There are four different processes now in use. Three of these are being utilized by only one company each. The fourth process is universal among all the other manufacturers of which there is now a total of 50. This process will be discussed as much as is permissible in detail.

A process using cold work throughout was the method which the majority of those experimenting in the field chose as most likely to succeed. In this process, the first step is to produce a blank from sheet stock, the size and thickness of the blank being determined by the amounts of metal required for the case in its entirety and the thickness of the greatest section in the case. The blank is first formed into a cup. The exact conformation of that cup varies somewhat

DENTAL MIRROR EXPOSES FAULTS IN CRANKSHAFT TEETH

LIKE human teeth, the spline teeth in the crankshaft of an airplane engine have parts which cannot be inspected by direct vision, so the tiny, long-handled mirror commonly used by dentists is employed by inspectors in the Pratt & Whitney Aircraft division of United Aircraft Corp. at East Hartford, Conn., to expose any minute grains of foreign metal left at the "root" of the gear teeth during production operations. Careful inspection is essential because broken spline teeth end the service life of the crankshaft

and will be discussed briefly later. Following the cupping operation, the cups are drawn by perfectly conventional methods to a cylindrical section of sufficient size to produce the finished case. Following that, the cylindrical structure is formed, in tapering dies, to the final shape.

Then by the machining methods, the accurate shape of the head of the case is produced, and the excess at the mouth cut off to the proper length. Spaced through the drawing operations are annealing processes necessary to restore the metal to a condition to permit additional cold work and finally stress relieved to eliminate internal strain and to produce the final physical properties needed for successful functioning. At the present time, there is no evidence to indicate the necessity of heat treatment involving quench and draw procedures. Many excellent cases have been made using such heat treatment, but these are avoided if possible because such procedure costs more, takes longer to build, would require additional facilities difficult to obtain and knowledge of a complicated art. It must at all times be remembered that huge quantities of cartridge cases must be made and therefore, they must be made in plants many of which have no previous experience in working steel in the manner required. Therefore, the simplest possible methods must be utilized.

Another reason for selecting the cold work process is the fact that there already existed a large active industry making cartridge cases from brass and it was intolerable to consider the economic dislocation of this industry by converting to a process entirely foreign to their practices. Machinery and equipment of these manufacturers must be used and the development of the steel cases was directed along channels which would contemplate the complete usage of these facilities.

That the reasoning was sound is borne out by the fact that some of the most valuable contributions were made to the development by companies which in their entire history had never before worked in steel. The Chase Brass & Copper Co. at its plant in Euclid, O., bids fair to become one of the largest producers of steel cartridge cases and it utilizes to the fullest equipment purchased and installed for the manufacture of cases from brass.

It is further interesting to note that experience to date indicates the steel cartridge cases made by the process briefly outlined above will cost materially less than brass cases. These gains in cost bid fair to realize millions of dollars of savings during the time of war.

The three other processes now being used, each by a single producer, are similar to the extent that the early operations are done hot. And the hot operations again simply produce the cup referred to above. After the formation of a cup, the case is finished by the same cold work process and the physical properties are produced by those processes. The first of these methods is that developed by the Buick Motor Division, Flint, Mich. This process starts with a slug of steel cut from bar stock. This piece is heated and forged in two operations into a cup from which the finished case is drawn. Buick engineers have spent many months in the development of the process and have reached the point where they are now producing steel cartridge cases in quantities.

The second hot method is that developed by the Ingersoll Steel & Disc Division of the Borg-Warner Corp., Chicago. Here again hot methods are used only to produce the cup. This process makes use of Torbend machines which this company has used for many years. In this process, a disc of steel is heated and rolled in circular rolls to produce a portion of the conformation of the finished case prior to cupping the piece to a form ready for cold work. Here again the physical properties of the finished cases are obtained by cold work.

From Disc to Cup

Third, the process developed by the McCauley Metal Products Co., Buffalo, again starts with a disc stamped from sheet and the disc formed directly into a cup in a single operation while at comparatively high temperatures. And again the final condition and conformation of the case is produced by cold work methods.

From the foregoing, it is readily seen that the only differences in the four processes are the steps taken to form the cup from which the case is finally made. In general, it is the feeling of the Steel Cartridge Case Industry Committee charged with the accomplishment of this development that the cold process is more easily accomplished than the hot process. There is one basic reason for this feeling. The processing of steel at

(*Please turn to Page* 83)

PLAN SUPERPLANES FOR WAR AND PEACE

To direct designing and development of superplanes Curtiss-Wright Corp.'s airplane division has named a group of experts to supervise the program of its new research laboratory, one of America's largest, now being completed at Buffalo.

Shown here studying plans for the new laboratory, are (seated-center) Dr. C. C. Furnas, formerly of Yale University, the newly appointed director of the laboratory; (seated-left) Dr. Norton Moore, chief of the Aerodynamics Research, and co-designer of the laboratory's new $2,100,000 wind tunnel; (seated-right) W. E. Voisinet, manager of the laboratory. Standing (left to right), are C. G. Trimbach, assistant chief of developments; E. S. Jenkins, chief of materials and structures; and Peter E. Rossmann chief of developments department.

Record Orders Received by General Electric, Westinghouse

Orders received by General Electric Co., Schenectady, N. Y., during 1942 reached the all-time record total of $2,003,039,000, compared with $1,132,837,000 for 1941, an increase of 77 per cent, Gerard Swope, president, announced last week. Westinghouse Electric & Mfg. Co., received orders for "well over a billion dollars worth of war needed equipment in 1942," according to a report by A. W. Robertson, chairman, to the board of directors. This compared with $582,808,634 in 1941.

—o—

Notice has been received by Blaw-Knox Co., Pittsburgh, to proceed with construction on the addition to its Union Steel Castings Division tank-armor castings plant on which work was postponed last November.

—o—

American-Marietta Co., Chicago, Grover M. Hermann, president, has purchased the Ferbert-Shorndorfer Co., industrial paint manufacturer with plant and office in Cleveland, and will operate it as a subsidiary. David Andrew will continue as president, and Guy Bartholomew, as vice president of Ferbert-Shorndorfer. Mr. Hermann has become board chairman of the Cleveland company.

—o—

Carpenter Steel Co., Reading, Pa., has moved its St. Louis district warehouse from 4063 Forest Park avenue to larger quarters at 712 Cass avenue. K. L. Crickman is St. Louis district manager.

—o—

Construction of a new plant for Hydraulic Machinery Inc., Detroit, has been started at 12801 Ford road, Dearborn, Mich., to combine activities under one roof. The 17,500 square feet of floor area when completely equipped will increase company's capacity about 75 per cent.

—o—

Wilson & Bennett Mfg. Co., Chicago, a subsidiary of Inland Steel Co., has changed its name to Inland Steel Container Co. The company's regular line of steel containers, drums and pails has been expanded to include fiber containers required to fill demand for packaging many essential war products. H. Denbigh Ellis is president of the subsidiary.

—o—

Majestic Co., Huntington, Ind., manufacturer of metal building products, recently put into operation a new plant in Huntington equipped to produce aluminum castings by a special permanent mold process. The new company will be known as Majestic Aluminum Co., with officials and executive staff the same as the parent organization. Its plant is now operating at capacity on aircraft work.

—o—

Strong, Carlisle & Hammond Co., Cleveland, has acquired all the stock in the Detrola Corp., Detroit. Detrola has been manufacturing special equipment for the armed forces and will be operated as a division of the Cleveland firm. Joseph J. Stephens, vice president and general manager of Strong, Carlisle & Hammond, will be president of Detrola.

—o—

The Pearson organization, founded 50 years ago by the late Dr. Fred Stark Pearson, has resumed activities as general and industrial engineers under the original corporate title of Pearson Engineering Corp., with offices at 41 East Forty-second street, New York. Officers include: Chairman of the board, H. P. Harrsen; president, F. A. Pearson; vice president, H. C. Hoeft; treasurer, H. M. Wise; secretary, W. A. Shepard.

—o—

Perfex Gage & Tool Co., Detroit, has completed erection of its new plant at 3603 Gaylord avenue. Containing 10,000 feet of floor space, the plant features air conditioned lap and inspection rooms which are kept at temperatures between 68 and 70 degrees.

—o—

Detroit Rex Products Co., Detroit, has moved its Los Angeles office to new and larger quarters at 1506 Santa Fe avenue. S. B. Crooks has been transferred from the mid-western region, with offices in Chicago, to Los Angeles as manager of the Pacific region. W. A. Vensel, formerly Pacific region manager, will supervise sales and service in the southern states.

—o—

Acquisition by the Joshua Hendy Iron Works of Sunnyvale, Calif., of Pomona Pump Co., Pomona, Calif.; Westco Pump Division, St. Louis, recently purchased by the Pomona concern; and the Hydril Co. of Torrance, Calif., announced recently by Charles E. Moore, president of Hendy company, projects the operations of his firm into four major engineering fields. The parent organization and affiliated companies, controlled by Mr. Moore and Henry J. Kaiser and associates, will turn out products in mechanical, electrical, hydraulic and steam engineering lines.

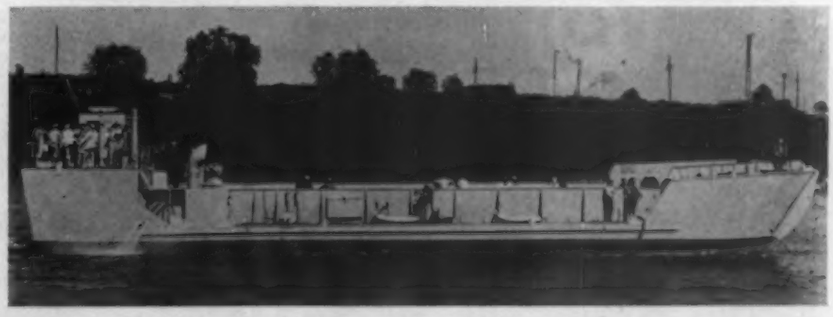
—o—

For the second time in two years, Koebel Diamond Tool Co., Detroit, has moved to larger quarters due to expansion. New location is 9456 Grinnell avenue, three doors from its former plant. Having more than twice the floor space, the new building will accommodate additional machines and a substantial increase in the working force.

—o—

Reynolds Metals Co., Richmond, Va., has purchased from the R. J. Reynolds Tobacco Co., the five-story concrete and steel factory building located between Tenth and Twelfth streets, Richmond. The building, 58 x 250 feet, contains 72,410 square feet of floor space. It is served by a railroad siding. No definite plans for its use have been announced by the company. Price was reported to be in excess of $100,000.

PREFABRICATED BARGES ASSEMBLED AT INLAND PLANT



THIS all-welded tank landing barge was fabricated in nine sections at inland shops and assembled at Quincy, Ill., on the Mississippi river by Quincy Barge Builders, a joint enterprise consisting of three companies as prime contractors. Efficiency for building the barges has won the companies—Bates & Rogers Construction Corp., Chicago; Mississippi Valley Structural Steel Co. with plants at Melrose Park and Decatur, Ill., and St. Louis; and Stupp Bros. Bridge & Iron Co., St. Louis—the Army-Navy "E" award to be presented at Quincy Jan. 20

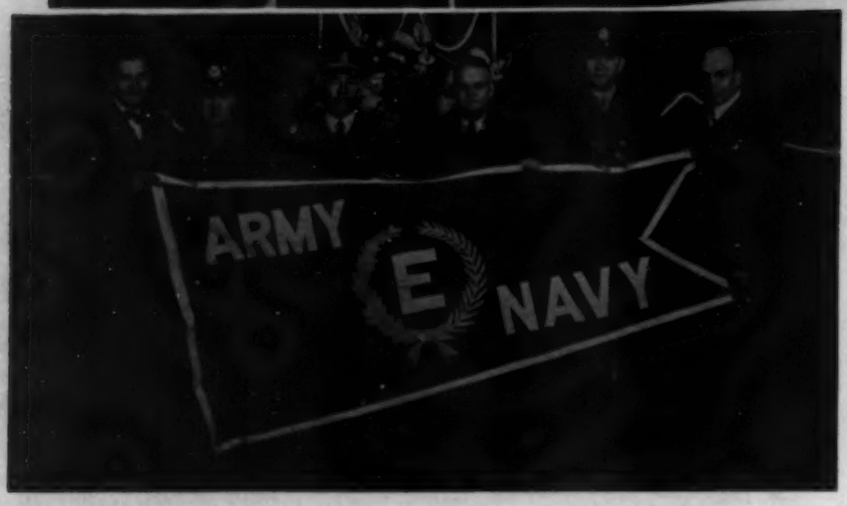
ARMY-NAVY AWARDS

Maj. Gen. William N. Porter, at microphone, below, compliments Dow Chemical Co., Midland, Mich., workers for "in some instances doubling designated capacities"

Ferro Enamel Corp., Cleveland, receives the "E" pennant, displayed at bottom of page. Left to right: Mayor Frank Lausche, Cleveland; Brig. Gen. Ray L. Avery, commanding general of Edgewood arsenal, Md.; Comm. C. S. Isgrig, Navy inspector for Cleveland district; Robert A. Weaver, Ferro Enamel president; Colonel Abel, Chemical Warfare Branch; William G. Rose, master of ceremonies

Achievements of workers was emphasized in ceremonies, left, attending presentation of "E" award to employes of Macwhyte Co., Kenosha, Wis.

Admiral H. L. Vickery, below, presents Maritime's "M" burgee to Gordon Lefebvre, vice president and general manager, Cooper-Bessemer Corp., Grove City, Pa.



Armed Services Honor Production Soldiers

Meritorious production of war materials won the Army-Navy "E" awards for the following industrial companies, as announced last week.

Allied Chemical & Die Corp., Frankford plant, Barrett division, Philadelphia.

Anderson Brass Works Inc., Shell plant, Birmingham, Ala.

Arter Grinding Machine Co., Worcester, Mass.

Atlantic Products Corp., Trenton, N. J.

Bamberger Reinthal Co., Cleveland.

Black & Decker Mfg. Co., Towson, Md.

Boston Gear Works, North Quincy, Mass.
Brewster Co., Shreveport, La.
Butler Mfg. Co., Kansas City, Mo.
Continental Roll & Steel Foundry Co., Coraopolis, Pa.
Corning Glass Works, Corning, N. Y.
Ehrhardt Tool & Machine Co., St. Louis.
Joseph N. Eisendrath Co., Marinette, Wis.
Electronic Laboratories Inc., Indianapolis.
Ford, Bacon & Davis Inc., Arkansas Ordnance plant, Jacksonville, Ark.
Ford Motor Co., Aircraft Engine Division, Dearborn, Mich.
General Motors Corp., Rochester Products Division, Rochester, N. Y.
General Power Inc., Quapaw, Okla.
Goddard & Goddard Co. Inc., Detroit.
George Gorton Machine Co., Racine, Wis.
Hercules Powder Co., Kenvil and Parlin, N. J.
Hoover Co., North Canton, O.
Hunkin-Conkey Construction Co., and Holabird & Root, Scioto Ordnance Plant, Marion, O.
Internationl Register Co., Chicago.
Michigan Seamless Tube Co., South Lyon, Mich.
Morley Co., Portsmouth, N. H.
National Carbon Co. Inc., Krene division, Bennington, Vt.
National Machine Products Co., Detroit.
Perfection Steel Body Co., Galion, O.
Portland Forge & Foundry Co., Portland, Ind.
Powers & Co., Chicago and River Forest, Ill.
Revere Copper & Brass Inc., Detroit.
Sanderson & Porter, Joliet, Ill.
Schwitzer & Cummins Co., Indianapolis.
Tokheim Oil Tank & Pump Co., Fort Wayne, Ind.
West Construction Co., Kenai Peninsula, Alaska.
Andrew Weston Co. Inc., Montauk Point, N. Y.
Fairchild Engine & Airplane Corp., Airplane Division, Hagerstown, Md.
Felters Co. Inc., Millbury, Mass.
International Harvester Co., St. Paul.
W. C. Norris, Manufacturer, Inc., Tulsa, Okla.
Pitney-Bowes Postage Meter Co., Stamford, Conn.
Rohm & Haas Company, Bristol, Pa.
Servel Inc., Evansville, Ind.
DeVilbiss Co., Rubber Products plant, Toledo, O.
Fairbanks, Morse & Co., Beloit, Wis., Freeport, Ill., and Three Rivers, Mich.

—o—

Crucible Fuel Co., subsidiary of Crucible Steel Co. of America, New York, has filed a certificate of election to dissolve the company with the Department of State of Pennsylvania. Crucible Fuel Co. will become a division of Crucible Steel, owning and operating coal mines.

More War Plant Work Authorized by Defense Corp.

WPB'S CURRENT SUMMARY OF PLANT EXPANSION

Government commitments for war plant expansion, June, 1940-Oct. 31, 1942	$13,551,000,000
Private commitments for war plant expansion, June, 1940-Nov. 30, 1942 (11,277 certificates of necessity approved)	$ 3,722,000,000

AUTHORIZATIONS for new war plant facilities and equipment by Defense Plant Corp. continue at a high rate. All will be operated by private companies, with DPC retaining title. Among contracts announced last week by Jesse Jones, secretary of commerce, are:

With Standard Oil Co. of Indiana to provide plant facilities in Illinois at a cost of more than $13,000,000.

With Rigid-Tex Corp., Buffalo, to provide plant facilities in New York.

With General Electric Co., Schenectady, N. Y., to provide additional equipment in a plant in Indiana at a cost in excess of $100,000.

With Siboney Distilling Corp., Philadelphia, to provide equipment in a plant in Pennsylvania at a cost in excess of $450,000.

With Clifford Mfg. Co., Boston, to provide additional equipment for a plant in Massachusetts, at a cost in excess of $175,000, resulting in an overall commitment in excess of $1,200,000.

With Ladish Drop Forge Co., Cudahy, Wis., to provide additional facilities in a plant in Wisconsin at a cost of more than $450,000, resulting in an overall commitment in excess of $8,000,000.

With Reynolds Metals Co., Louisville, Ky., to provide additional plant facilities in Kentucky, at a cost in excess of $1,500,000, resulting in an overall commitment in excess of $4,500,000.

With American Central Mfg. Corp., Connersville, Ind., to provide plant facilities in Indiana at a cost in excess of $150,000.

With Pacific Tube Co., Los Angeles, to provide plant facilities in California at a cost in excess of $1,500,000.

With Electromatic Typewriters Inc., Rochester, N. Y. to provide equipment for a plant in New York at a cost in excess of $150,000.

With Union Dental Instrument Mfg. Corp., Philadelphia, to provide equipment for a plant in Pennsylvania.

With Broadfoot Iron Works, Wilmington, N. C., to provide equipment in a plant in North Carolina.

With General Motors Corp., Detroit, to provide for further expansion of a plant in Michigan at a cost in excess of $900,000, resulting in an overall commitment in excess of $2,500,000.

With Krome Corp., Marshfield, Oreg., to provide further expansion of a plant in Oregon. This increase will result in an overall commitment in excess of $450,000.

Prescribe Redress Procedures For Wrongfully Seized Patents

A general order prescribing procedures by which persons whose patents or patent applications have been seized by error by the Office of Alien Property Custodian may regain title to their property has been announced by the Alien Property Custodian Leo T. Crowley.

Most of the errors resulted from clerical mistakes and, in large measure, from change affecting the inventor or the patent which are not of record at the Patent Office or which were not discovered prior to seizure.

General Order No. 15 prescribes two short forms by which redress may be sought in the two most numerous classes of wrongful seizure, inventors who lived in enemy countries at the time their patent application was filed or patent granted and who since have come to the United States, and bona-fide American assignees of enemy patents whose assignments were recorded in the United States Patent Office before Jan. 1, 1939.

Republic Steel Redeems Over $10,000,000 of Serial Notes

Republic Steel Corp., Cleveland, has notified the Securities and Exchange Commission of the retirement on Dec. 1, 1942, of $10,607,142.85 of its 2 per cent Serial Notes. Of the original loan of $16,500,000 made by a group of banks in March, 1941, with semiannual maturities over a period of seven years, there remain outstanding only the 1943 maturities due March 1 and Sept. 1, amounting in all to $2,357,142.86.

Equipment Needed To Handle 25 to 50% Increase in Freight

RESTRICTIVE governmental control over the use of transportation services will be necessary unless the railroads are allocated sufficient materials to permit them to maintain and renew their facilities.

This warning is contained in the annual report of the Interstate Commerce Commission to Congress.

The commission emphasizes that the success so far of the transportation agencies in meeting the increased demands upon them has been largely the result of the maintenance of their physical plant and equipment in good condition in the period immediately before this country's involvement in the war when materials and labor were available, and also to the fact that the carriers and shippers have worked diligently and harmoniously to promote economy in the use of transportation.

"It seems safe to say," the commission reports, "that the continuance of sufficient transportation during the war depends more upon adequate maintenance and replacement of physical plant and equipment of the carriers than on any other factor. Some increase in equipment also is clearly necessary."

Appeals to Shippers

Other agencies concerned with transportation problems concur in the commission's opinion that greater loads must be hauled in 1943 and that more materials for equipment must be made available.

M. J. Gormley, executive assistant, Association of American Railroads, says at least 5 per cent more service will be required of all rail equipment even if the railroads are allotted the materials to build the additional freight cars and locomotives they will need.

Fred S. Keiser, associate director of the railway transport division, Office of Defense Transportation, predicts a minimum of 25 per cent and a probable 50 per cent increase in rail freight movement over 1942. Mr. Keiser appealed to shippers voluntarily to eliminate cross-hauling and circuitous routing to help the roads handle the increased load. Otherwise, he declared, the government will take control of freight routing.

Mr. Gormley estimates the carriers will be called upon to handle 75 per cent more freight business and 40 per cent more passenger traffic than in 1918, peak year of the last war.

To handle the prospective traffic, he points out, the railroads have asked the government for authorization to obtain 80,000 new freight cars and 900 new locomotives before next October. WPB recently approved some of this equipment, but, according to Mr. Gormley, "at a monthly rate somewhat lower than the railroads proposed."

However, he continues, further consideration of the railroads' construction and maintenance program has been promised by the WPB and "it is to be hoped that more materials and equipment will be allowed, especially the locomotives which the railroads need so badly."

In spite of the fact the railroads are handling 85 per cent of the increase in freight traffic moving by all agencies of transportation, Mr. Gormley said, they are doing the job without the sort of transportation difficulties that were encountered during the first World War.

"There is no large accumulation of loaded cars anywhere in the United States. There are no transportation demands that are not being met. Our ports are wide open and entirely liquid. Traffic is moving swiftly and safely, and there are no serious delays.

"Moreover, the job is being done with approximately 500,000 fewer freight cars and about 22,000 fewer locomotives than the railroads had in 1918, and only a few more freight cars and actually fewer locomotives than they had at the outbreak of war in 1939."

Forecasts Good Times in First Few Postwar Years

Experience of the United States after major wars indicates that the first two years or so of peace are likely to be characterized by good times rather than bad, according to a survey released last week by the Brookings Institution, Washington.

Contrasting the situation anticipated at the end of this war with that which obtained after the first World War, the study finds the following major factors likely to be operating:

Favorable—A retarded rate of demobilization; large reconstruction requirements abroad; domestic shortages of consumer goods; deferred maintenance and replacement of industrial equipment; housing deficiencies; relatively large purchasing power; a less extensive inflation of prices; and large public works spending.

Unfavorable — The unprecedented size of the employment problem; difficulties in reconverting industries; possible shortages of working capital in industry; high corporate taxes; and an unfavorable ratio of costs to selling prices in industry, particularly manufacturing.

Question of whether a satisfactory cost-price ratio will obtain in manufacturing is crucial, because it is in this industry that the greatest volume of reemployment must take place.

During the first World War, wage rates did not rise as much as the wholesale prices of manufactured products, whereas during this war the reverse has been true thus far. Also, the prices of raw materials in this war have risen nearly twice as much as the prices of manufactured products, whereas in the last war the rise was roughly proportional.

Unfavorable cost-price ratio thus far has been offset by the economies inherent in increased volume of output. After the war, however, the volume of manufacturing may shrink. If a comprehensive price control program should support wage rates and prices of farm products at wartime levels, while preventing prices of manufactured products to adjust themselves to costs, widespread losses would result in many lines.

Stabilization of Building Costs Shown by Index

Factory building costs advanced 2.7 per cent in 1942, according to the index computed quarterly since 1913 by The Austin Co., Cleveland, engineers and builders. The index stands at 115, compared with 112 at the end of 1941 and a peak of 135 reached during the last war.

"This limited increase in construction costs, in the face of a 60-65 per cent advance in building activity, is indicative of the extent to which the government has succeeded in stabilizing basic cost factors during our first year of war," said George A. Bryant, president. His firm is currently engaged in design and erection of more than 60 war plants in various parts of the country.

The year 1942 was phenomenal in the growth of the industrial facilities in Chicago, $569,535,000 having been invested in plants and equipment and representing the greatest forward step in industrial plant development of any single year of the city's history, according to the industrial department of the Chicago Association of Commerce.

Index of Activity Below Pre-Holiday Levels

During the first full week of the new year industrial activity in the steel and other metalworking industries failed to rebound to pre-holiday record levels.

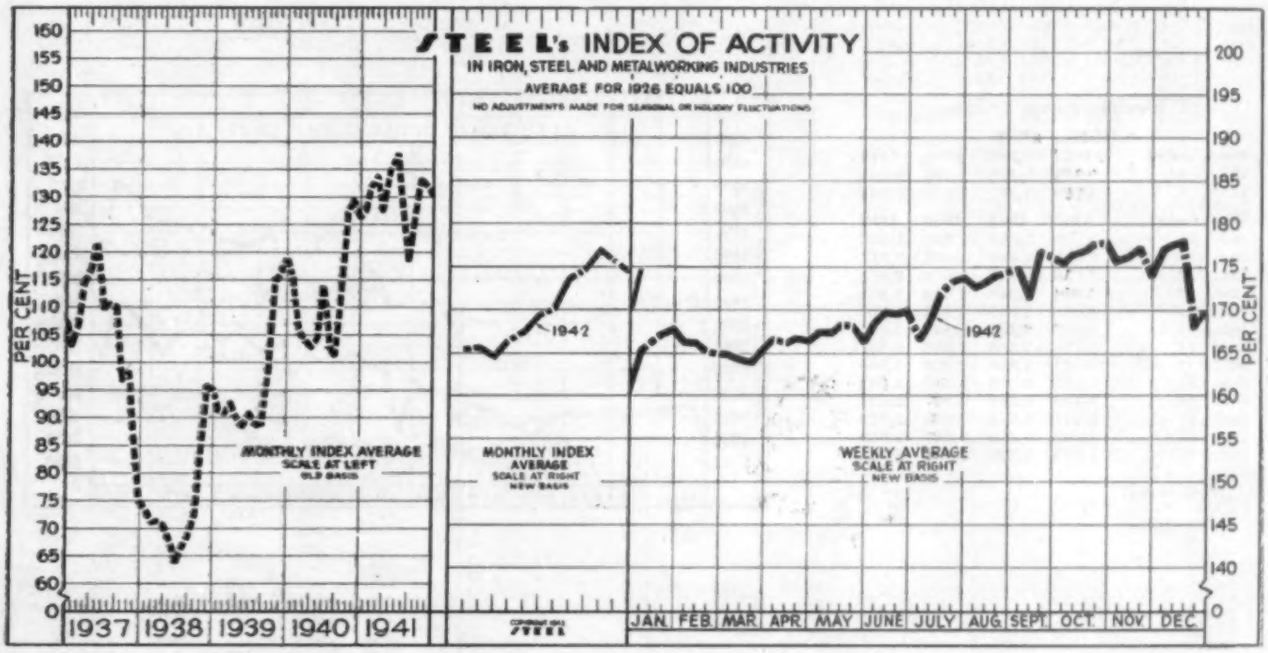
For the week ended Jan. 9, STEEL's index advanced 4.6 points to 174.6. This compares with 165.6 in the week a year ago, but it is below the all-time peak of 178 established in the period ended Dec. 19 last.

Due mainly to flood conditions in the Ohio valley area, the national steel rate dropped 1.5 points to 97.5 per cent of capacity in the weeks ended Jan. 2 and 9. Later, however, steel production rebounded to about 99 per cent.

Changing conditions in war requirements are reflected in variations in demand for steel products. Supply situation in plates and sheets has eased somewhat, while demand for carbon and alloy steel bars continues steadily upward. Steel scrap dealers have sufficient stocks to keep them processing for some time. Labor shortage in many instances has made their work difficult in recent weeks. Steel mill operators are fairly well situated as to scrap supplies.

Electric power consumption again advanced during the latest period, to 3,952,587,000 kilowatts. This is an increase of 13.8 per cent over that recorded in the like 1942 period, and compares with record high of 3,975,873,000 kilowatts.

Revenue freight carloadings are estimated to have totaled about 675,000 during the week ended Jan. 9. In comparable period last year freight traffic amounted to 737,172 cars.


STEEL's INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
AVERAGE FOR 1926 EQUALS 100
NO ADJUSTMENTS MADE FOR SEASONAL OR HOLIDAY FLUCTUATIONS
PER CENT
MONTHLY INDEX AVERAGE SCALE AT LEFT OLD BASIS
MONTHLY INDEX AVERAGE SCALE AT RIGHT NEW BASIS
WEEKLY AVERAGE SCALE AT RIGHT NEW BASIS
1942
1942
1937 1938 1939 1940 1941
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

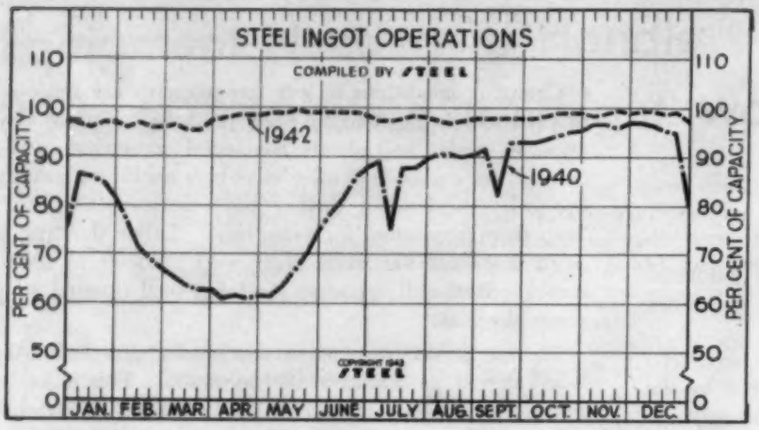
STEEL's index of activity gained 4.6 points to 174.6 in the week ending Jan. 9:

Week Ended	1942	1941
Nov. 14	176.2	133.8
Nov. 21	177.3	128.4
Nov. 28	174.0	132.2
Dec. 5	177.1	133.4
Dec. 12	177.6	134.0
Dec. 19	178.0	132.9
Dec. 26	167.8	120.5
Week Ended	**1943**	**1942**
Jan. 2	170.0	161.0
Jan. 9	174.6†	165.6

†Preliminary.

Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Jan.	165.7	127.3	114.7	91.1	73.3	102.9	85.9	74.2	38.8	48.6	54.6	69.1
Feb.	165.6	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5
March	164.6	153.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
April	166.7	127.2	102.7	89.8	70.8	116.6	100.8	85.0	88.6	52.4	52.8	81.0
May	167.7	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
June	169.4	158.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
July	171.0	128.7	102.4	83.3	66.2	110.4	100.1	73.3	63.7	77.1	47.1	67.3
Aug.	173.3	118.1	101.1	83.9	68.7	110.0	97.1	76.7	60.0	74.1	45.0	67.4
Sept.	174.8	126.4	113.3	98.0	72.3	96.8	86.7	69.7	56.9	68.0	46.5	64.8
Oct.	176.9	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	68.1	48.4	59.2
Nov.	175.8	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.3	54.4
Dec.	174.1	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3

Note: Weekly and monthly indexes for 1942 and 1943 have been adjusted to offset the forced curtailment in automobile production and to more accurately reflect expanding steel production



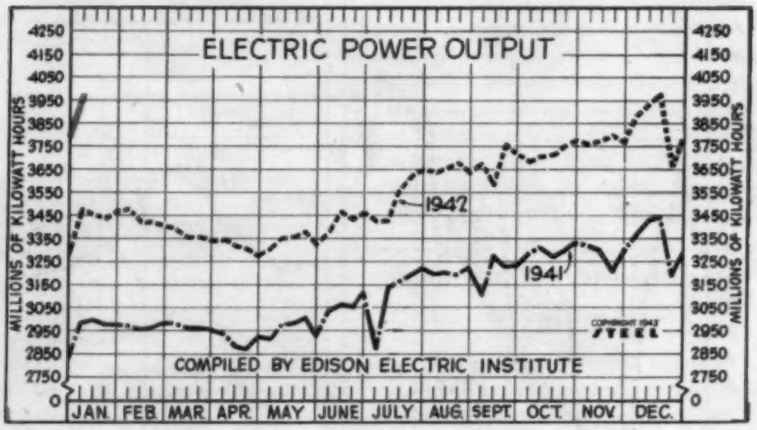
Steel Ingot Operations
(Per Cent)

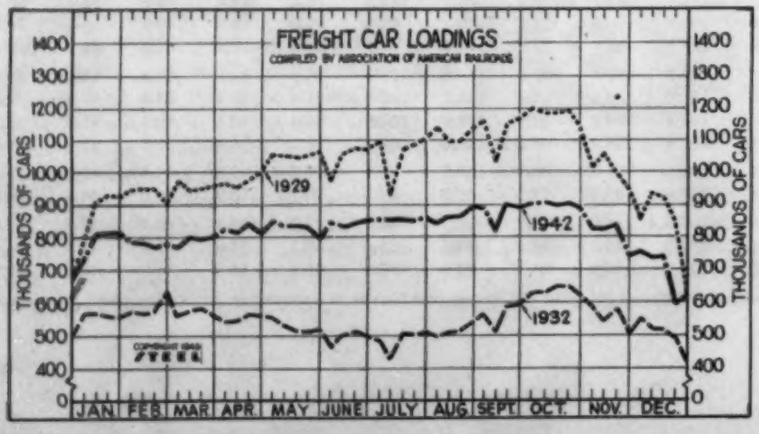
Week ended	1943	1942	1941	1940
Jan. 9	97.5	96.5	93.0	86.0
Jan. 2	97.5	97.5	92.5	86.5
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	99.0	93.5	80.0	75.5
Dec. 19	99.0	97.5	95.0	90.5
Dec. 12	99.5	97.5	95.5	92.5
Dec. 5	99.5	96.5	96.5	94.0
Nov. 28	99.0	95.0	97.0	94.0
Nov. 21	99.5	95.5	97.0	93.5
Nov. 14	99.0	97.0	96.0	93.5
Nov. 7	98.5	97.5	96.5	93.0
Oct. 31	99.0	95.5	96.5	93.0
Oct. 24	99.0	95.5	95.5	92.0
Oct. 17	99.0	96.5	95.0	91.0
Oct. 10	98.5	94.5	94.5	89.5
Oct. 3	98.0	96.0	93.5	87.5
Sept. 26	98.0	96.0	93.0	84.0

Electric Power Output
(Million KWH)

Week ended	1943	1942	1941	1940
Jan. 9	3,953	3,473	2,985	2,668
Jan. 2	3,780	3,289	2,831	2,558
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	3,656	3,234	2,757	2,465
Dec. 19	3,976	3,449	3,052	2,712
Dec. 12	3,938	3,431	3,004	2,674
Dec. 5	3,884	3,368	2,976	2,654
Nov. 28	3,766	3,295	2,932	2,605
Nov. 21	3,795	3,205	2,839	2,561
Nov. 14	3,778	3,305	2,890	2,587
Nov. 7	3,762	3,326	2,858	2,589
Oct. 31	3,775	3,339	2,883	2,609
Oct. 24	3,753	3,299	2,867	2,622
Oct. 17	3,717	3,273	2,838	2,576
Oct. 10	3,702	3,315	2,817	2,583
Oct. 3	3,683	3,290	2,792	2,554

†Preliminary.





Freight Car Loadings
(1000 Cars)

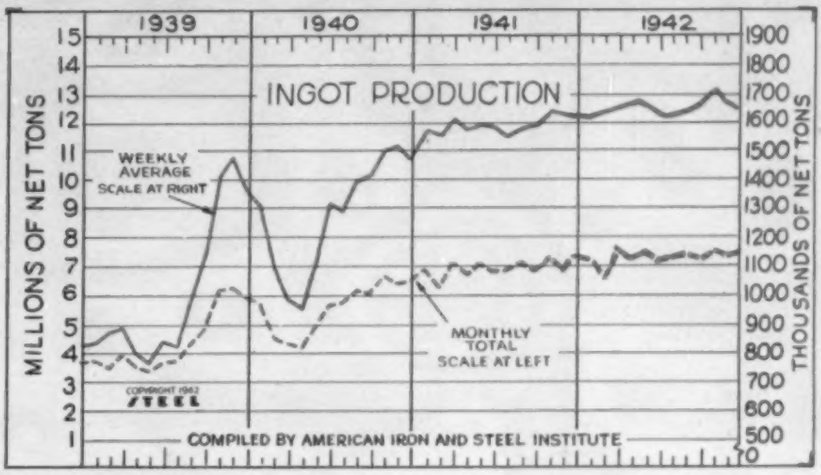
Week ended	1943	1942	1941	1940
Jan. 9	675	737	712	668
Jan. 2	621	674	614	592
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	592	607	545	550
Dec. 19	743	799	700	655
Dec. 12	740	807	736	681
Dec. 5	760	833	739	687
Nov. 28	844	866	729	689
Nov. 21	836	799	733	677
Nov. 14	827	884	745	771
Nov. 7	829	874	778	786
Oct. 31	891	895	795	806
Oct. 24	903	914	838	834

†Preliminary.

Steel Ingot Production

(Unit 100 Net Tons)

	Monthly Total		Weekly Average	
	1942	1941	1942	1941
Jan.	7,124.9	6,922.4	1,608.3	1,562.6
Feb.	6,521.1	6,230.4	1,630.3	1,557.6
Mar.	7,392.9	7,124.0	1,668.8	1,608.1
April	7,122.3	6,754.2	1,660.2	1,574.4
May	7,386.9	7,044.6	1,667.5	1,590.2
June	7,022.2	6,792.8	1,636.9	1,583.4
July	7,148.8	6,812.2	1,617.4	1,541.2
Aug.	7,233.5	6,997.5	1,632.8	1,579.6
Sept.	7,067.1	6,811.8	1,651.2	1,591.5
Oct.	7,584.9	7,236.1	1,712.2	1,633.4
Nov.	7,184.6	6,960.9	1,674.7	1,622.6
Dec.	7,303.2	7,150.3	1,652.3	1,617.7
Total	83,092.2	82,836.9	1,651.2	1,588.7



Finished Steel Shipments
U. S. Steel Corp.

(Unit 1000 Net Tons)

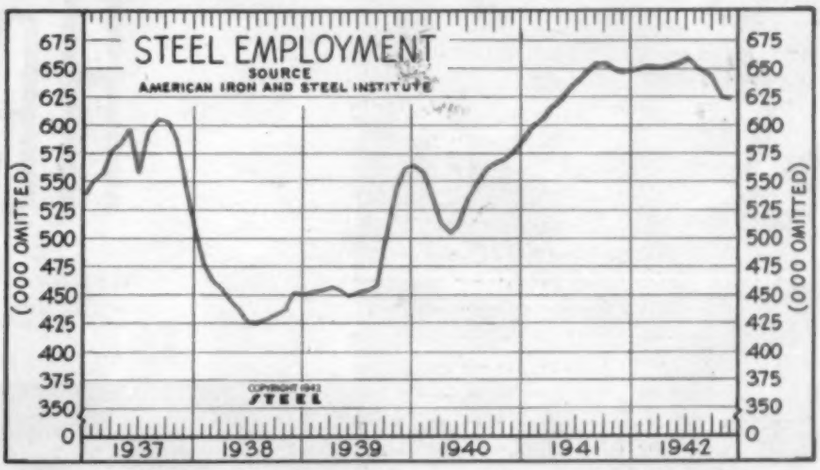
	1942	1941	1940	1939	1938
Jan.	1738.9	1682.5	1145.6	870.9	570.3
Feb.	1616.6	1548.5	1009.3	747.4	522.4
Mar.	1780.9	1720.4	931.9	845.1	627.0
Apr.	1758.9	1687.7	907.9	771.8	550.5
May	1834.1	1745.3	1084.1	795.7	509.8
June	1774.1	1668.6	1209.7	807.6	525.0
July	1765.7	1666.7	1296.9	745.4	484.6
Aug.	1788.7	1753.7	1455.6	885.6	615.5
Sept.	1703.6	1664.2	1392.8	1086.7	635.6
Oct.	1787.5	1851.3	1572.4	1345.9	730.3
Nov.	1665.5	1624.2	1425.4	1406.2	749.3
Dec.	1849.6	1846.0	1544.6	1444.0	765.9
Tot.†		20,458.9	15,013.7	11707.3	7315.5

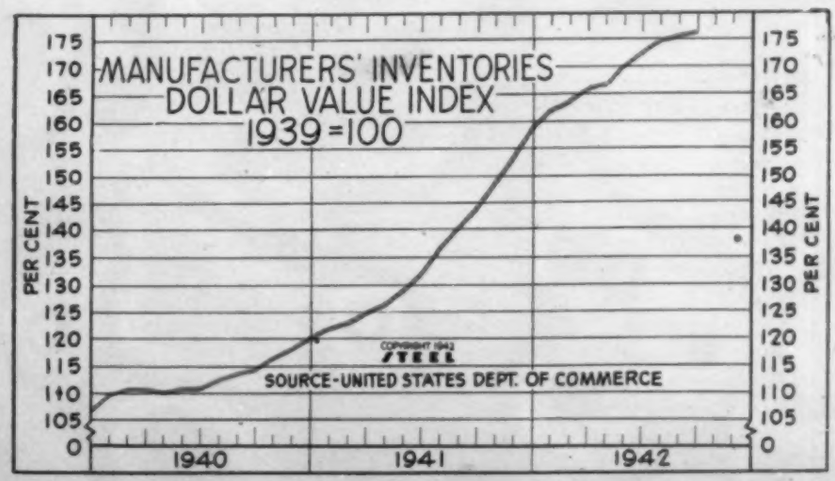
†After year-end adjustments.

Steel Employment

(000 omitted)

	1942	1941	1940	1939	1938
Jan.	651	598	556	451	475
Feb.	651	603	538	453	461
Mar.	653	613	514	455	455
Apr.	654	621	503	452	445
May	656	632	510	448	436
June	659	638	535	451	425
July	655	648	549	453	424
Aug.	647	654	560	458	427
Sept.	641	652	565	502	431
Oct.	623	646	568	545	436
Nov.	620	645	577	561	450
Dec.	...	646	585	563	449





Manufacturers' Inventories
Dollar Value Index

1939 = 100

	1942	1941	1940	1939
Jan.	161.9	121.8	109.5	100.9
Feb.	163.0	122.7	110.6	100.4
March	165.6	124.1	110.5	99.5
April	167.0	126.0	110.0	98.5
May	170.4	128.7	110.5	97.9
June	172.9	132.0	110.6	97.4
July	174.2	136.4	112.2	98.1
Aug.	175.0	140.0	113.3	98.8
Sept.	175.4	143.4	114.1	98.9
Oct.	.....	148.3	116.2	101.3
Nov.	.....	152.7	117.7	104.5
Dec.	.....	158.5	119.9	107.2
Mo. Ave.	.....	136.2	113.0	100.3

Fig. 1—Stock piles of scrap rubber to be reclaimed at B. F. Goodrich Co., Akron, O.

Fig. 2—Automatic rotary knife removes wire bead portion of a scrap tire

Fig. 3—Scrap tire, with beads removed, is fed to the "cracker" or grinding machine to be broken into small pieces to facilitate removal of rubber from fabric

Fig. 4—This rubber, not containing cotton, has been chopped and screened through a mesh

Fig. 5—Dirt, treated fiber and excess fiber solvent are removed from the rubber pieces by agitated water in these conical wash tanks

Fig. 6—In these tanks rubber is depolymerized by steaming

Fig. 7—Hot rubber "mush" as it comes from the depolymerizer

Reclaiming

(Section 9 in a Series on Conservation and Substitution)

Rubber

By ARTHUR F. MACCONOCHIE
Head, Department of Mechanical Engineering
University of Virginia
University Station, Va.
And Contributing Editor, STEEL

OLD TIRES and inner tubes by the thousands, as well as boots, rubber overshoes and almost any other article containing rubber, are now used in making reclaim rubber. In turn, reclaim rubber is finding many important applications where it conserves natural rubber by replacing it entirely or in part. Fig. 1 shows a general view of some piles of scrap rubber at the Reclaim Division of the B. F. Goodrich Co., Akron, O. Other illustrations show details of reclaiming operations at this plant.

The first step in reclaiming rubber from old auto tires is to remove the wire bead portion from the tire. As shown in Fig. 2, this is accomplished by an automatic rotary knife. The bead portion, including a small amount of rubber, goes to a smelter for recovery of the metal. The tires are next ground up by cutters or corrugated rolls in a "cracker" or grinding machine to facilitate removal of rubber from the fabric. Fig. 3 shows a tire being fed to the cracker. The pulverized material is then placed in a vat where caustics eat the cotton from the rubber.

Inner tubes, tire treads and other rubber products not containing cotton do not require the use of caustics. They can be ground or chopped by high-speed revolving knives and screened through a mesh varying in size from 1 to 50 holes per inch. The screened stock, shown in Fig. 4, is run over a magnetic separator to remove fragments of iron or steel, then washed and riffled to take out nonmagnetic particles and other impurities. Two of the conical wash tanks can be seen in Fig. 5.

Next, the ground-up rubber is placed in drying pans, then moved into heaters where it is depolymerized by being subjected to steam pressure from 8 to 12 hours at 325 to 400 degrees Fahr. to plasticize it before going to the mixing mill. Tanks in which this operation is being car-

ried out can be seen in Fig. 6. Fig. 7 shows the rubber "mush" as it comes hot from the depolymerizer. It is kept moving into a squeezing device and then is dried on a continuous conveyor, the discharge point of which is shown in Fig. 8.

The reclaimed rubber, now in cake form, must be thoroughly mixed or kneaded under pressure on mill rolls. Accordingly the caked rubber is fed through a chute to the huge rolls of the plasticizer shown in Fig. 9. Pigments are added to give the rubber the properties desired in the finished product. In this view, the operator is removing a slab of partially plasticized rubber from the mill. In Fig. 13 slabs are being sent through another mill for further working. Dirt and foreign particles are carried off at the sides of the rolls. As it comes from the rolls at this stage the reclaim looks like raw rubber.

From the mixing mill, the reclaim goes to the strainer. Here, by means of a large worm screw, the rubber is extruded under pressure through screens where any remaining dirt or foreign matter is removed. The result is the ropey lengths seen in Fig. 14. The reclaim is then ready for final refining, the last processing operation.

Fig. 10 shows the extruded rubber entering the refiner mill, where it is worked by heavy rolls until paper thin. These thin sheets are next built up in laminated form on a drum and cut off when a slab of the desired thickness is obtained. A skid load of slabs of reclaim just as they have come from the refining mill is seen in Fig. 11. The material is now warehoused as shown in Fig. 12, ready to be used in the manufacture of various rubber products.

Laboratory control is important in the reclaim industry. Fig. 15 is a view in a research laboratory in the B. F. Goodrich Co.'s Reclaim Division.

For further details on natural, synthetic and reclaim rubber, see STEEL, Nov. 16, 1942, p. 80.

Fig. 8—Discharge end of continuous conveyor on which caked rubber is dried after depolymerization and squeezing

Fig. 9—Dried cake rubber is fed from a chute into a plasticizing mill

Fig. 10—Ropey lengths of "strained" rubber are fed to mill for final refining

Fig. 11—These slabs of reclaim have just come from final refining mill at left

Fig. 12—These thick, heavy sheets of reclaim are ready for fabrication into rubber products. Figs. 2, 3, 5, 6, 7, 8, 9, 12 and 14 are photos by Palmer, Photographic Section, Office of War Information

Fig. 13—In plasticizer, rubber is kneaded and thoroughly mixed under pressure of huge mill rolls

Fig. 14—Plasticized rubber is forced through a screen to remove bits of metal and fiber, the rubber emerging as spaghettilike strands

Fig. 15—View in research laboratory of Goodrich Reclaim Division. Figs. 1, 4, 10, 11, 13 and 15 are B. F. Goodrich Co., Akron, O., photos

COMBUSTION HAZARDS

By THEODORE A. COHEN
Chief Engineer
Wheelco Instruments Co.
Chicago

. . . . in heat-treating and other fuel-fired furnaces can be decreased greatly by use of modern automatic combustion safety equipment described here

POSSIBILITY of explosions in heat-treating furnaces as well as in direct-fired core ovens, metal melting pots and other industrial furnaces remains a serious hazard for an explosion may involve injury or death to employes as well as physical damage to equipment, breakdown in production, and disablement of other parts of the plant and equipment by fire resulting from the explosion.

Elimination of explosion hazards is gaining increased attention as management seeks every means of protecting and extending the life of equipment now installed. The production speedup in the heavy industries occasioned by the war program has, in many cases, transferred to relatively new hands the serious responsibility of tending equipment in which explosion hazards exist. To offset this as well as to provide permanent protection against loss of life and shutdown of plant due to human failure, more and more reliance is being placed upon combustion safety equipment to remove the explosion hazard.

Present-day combustion safety equipment has proved extremely trustworthy in preventing explosions under unexpected circumstances in applications ranging from small drying ovens and heat treating furnaces to the largest boiler furnaces in existence. Such equipment provides protection at a small fraction of the cost of equipment and plant given protection.

Of the four most common fuels used in the metals industry — gas, oil, electricity and coal — gaseous fuels are sometimes considered the greatest potential hazard from an explosion standpoint. Yet they often are treated with more carelessness than seemingly less hazardous fuels. Coal and oil-fired equipment are not to be disregarded when considering combustion safeguards as gases from these fuels in a hot combustion chamber present a serious hazard. Explosions with electrically fired equipment have occurred in industrial drying ovens where solvent vapors are given off in the drying process.

Records of one underwriting organization show explosions to have occurred in 44 oil-fired furnaces, 13 gas-fired and 12 pulverized coal units out of all classes of direct-fired equipment during a given period. These figures do not prove oil-fired equipment less satisfactory from a safety standpoint since there was a more widespread use of oil-fired equipment in the risks covered, but they do show a serious hazard exists in using each of the three types of fuels.

Further analyses of these explosions indicate 45 per cent were due to lack of burner safeguarding or lack of flame-failure safety equipment; 35 per cent to defective burner operation, including clogging; 8 per cent to poor burner maintenance; 3 per cent to distribution deficiencies; and 9 per cent to miscellaneous and undetermined causes.

While mere use of a fuel does not make for explosion, it is equally true that no oven, furnace or boiler, regardless of the fuel used, is immune from possible explosion hazards without combustion safeguards.

Explosions on Starting: The greatest number of explosions in industrial ovens and furnaces occur in starting, particularly in gas-fired units. Fuel may leak past valves in the fuel line to accumulate in the combustion chamber of an oven or furnace, where an explosion may result on insertion of the lighting torch or ignition of the pilot burner. Likewise, unburned fuel, such as oil may accumulate in the combustion chamber, gas from it mixed with air may produce an explosion mixture that can be ignited during the lighting procedure.

Ignition may be accidentally lost with decrease in fuel or lost with stop-

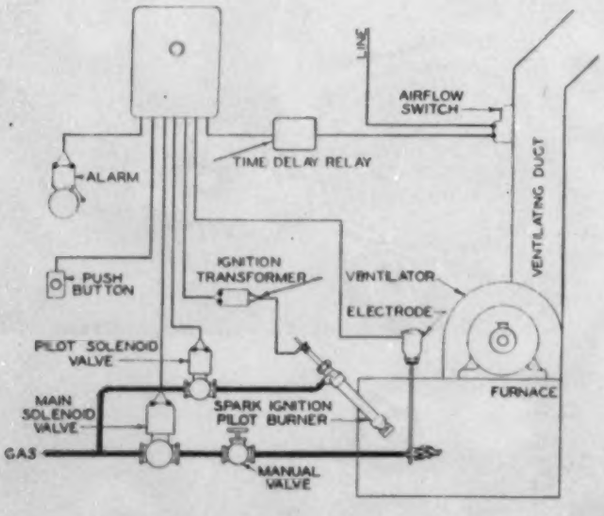
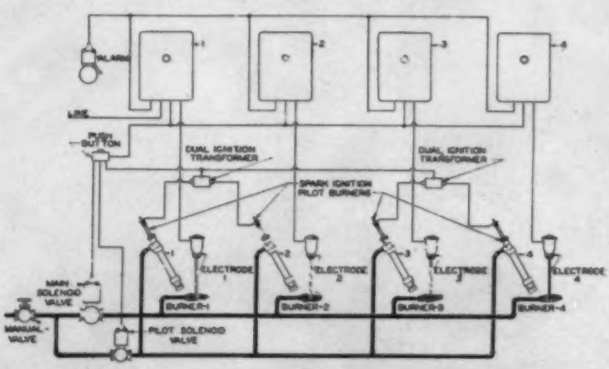


Fig. 1. (Left)—This setup for gas fuel provides for controlled purging of the combustion chamber

Fig. 2. (Below)—A multiple-burner gas-fired oven or furnace can be equipped with combustion safeguards which protect individual burners against flame failure



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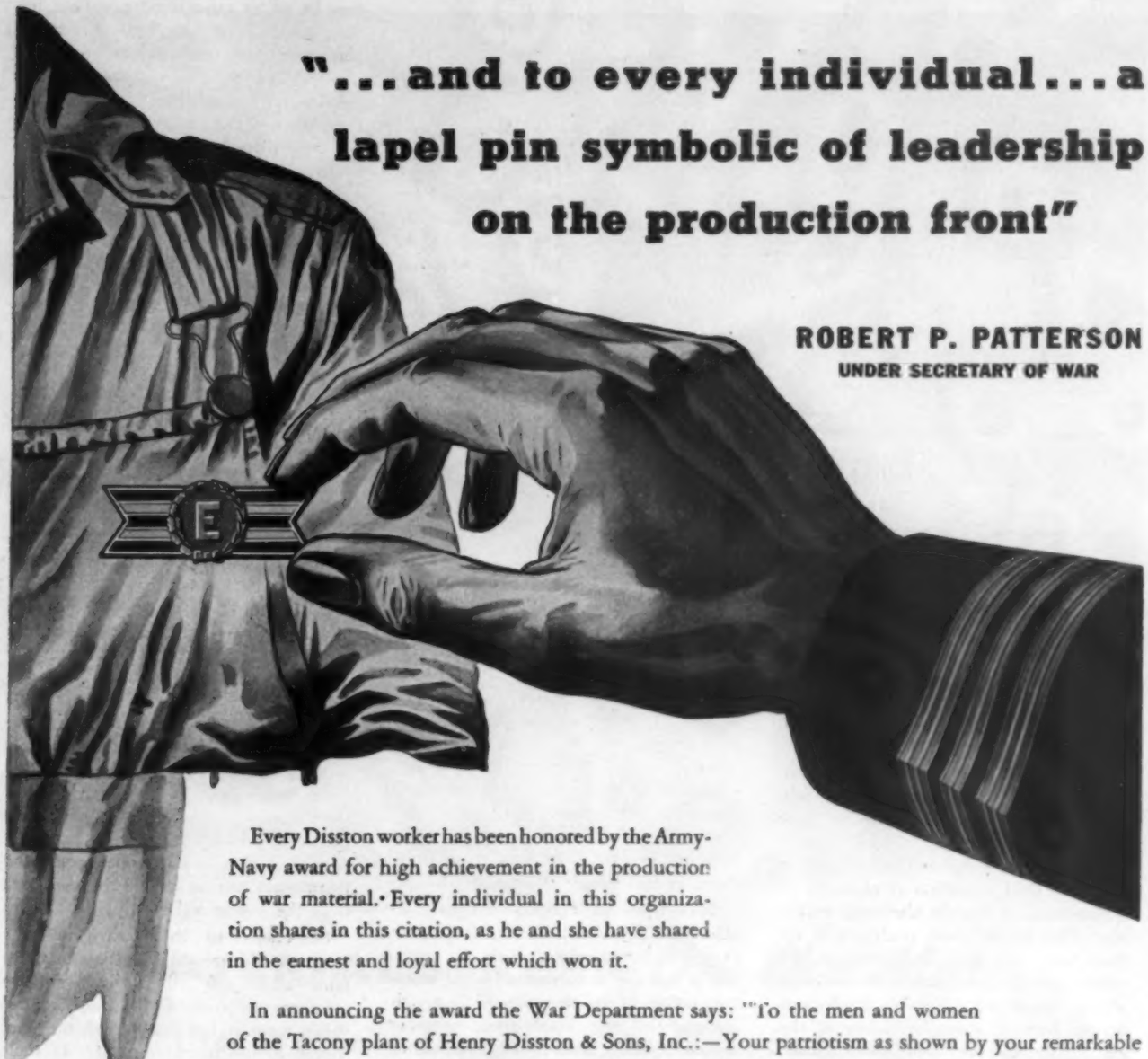
ROBERT P. PATTERSON
UNDER SECRETARY OF WAR



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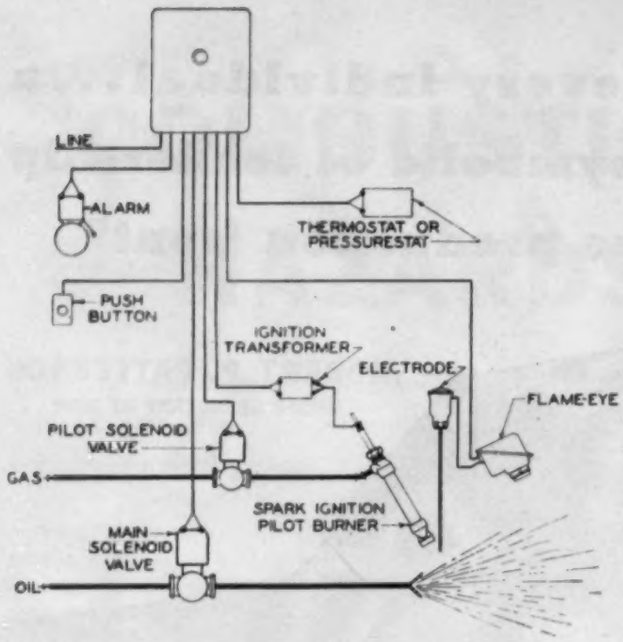

Fig. 3 — A controller actuated by either pressure or heat is included in this combustion safeguard for oil or pulverized-coal burning equipment

page of fuel and then fuel feed resumed without repeating the proper lighting cycle. Then part of the furnace may maintain sufficient heat for a short time to ignite the re-established fuel and produce an explosion.

A third explosion cause is a decrease in air supply to an extent where unburned fuel may accumulate in furnace or flues and ignite when proper fuel - air ratio is restored, or when the unburned fuel condition is changed to a condition of slightly abnormal excess air. This occurs more readily with oil than with gas. Raw fuel entering the combustion chamber may not be completely consumed, due to insufficient oxygen brought about by failure of the air supply fan or some other cause. The fuel accumulates in some portion of the combustion chamber, and when the air supply is re-established, the gas in the pocket is diluted to present an explosive mixture.

Prevention of Explosions: It is apparent on analysis of the above explosion hazards that explosions cannot occur on starting:

— If the furnace or oven has been purged of all fuel or hazardous vapors.

— If, after purging, an ample igniting flame from torch or some other source is properly applied to each burner before fuel is turned on.

— If air velocity at each burner is kept sufficiently low to prevent loss of ignition in starting.

— If fuel is sufficiently rich to insure immediate ignition from torch.

— If, after ignition is established, proper mixture of fuel and air is maintained at all operation rates.

Similarly explosions cannot occur after starting:

— If stable ignition has been attained.

— If a flame failure at burner causes an instantaneous shutdown in fuel supply.

— If a power failure to burner equipment causes an immediate shutdown in fuel supply.

— If a reduction or failure in air or fuel supply causes an immediate shutdown in fuel supply control means.

Importance in Purging: Proper consideration of all factors contributing to combustion explosions, both on starting a furnace or oven and after starting, points to the necessity of thorough purging of the combustion chamber before lighting, and to the importance of adequate flame - failure safety protection equipment.

Purging particularly required where gas is used, is also necessary in connection with oil and pulverized coal burning equipment. Oil or pulverized coal entering a furnace that is hot, though below the ignition temperature, may introduce a hazard by producing a vapor or gas, which, upon mixing with air, may ignite from the hot brick work of the unit.

There is a wide range of explosive limits where a hot furnace is slightly below the ignition temperature of the fuel, and if the fuel reaches a hot spot, a major explosion may occur with either a leaner or richer mixture than would explode in a cold furnace when first lighting off.

Purging is usually accomplished by an air flow switch in combination with a time relay that together supervise operation of a ventilating fan. The fan may be of an exhaust type, pulling the atmosphere from the furnace for replacement with fresh air, or may blow in fresh air to dilute and eventually force out all gases that might have accumulated in the chamber.

Combustion Safeguard: Two responsibilities are placed on a flame - failure safety device. It must cut off the fuel supply to a burner in case of flame failure or loss of ignition and must provide the cutoff quickly to prevent raw fuel from entering the combustion chamber after the flame failure has occurred.

Early flame - failure devices fall into two general classes, both making use of heat radiated directly from the flame.

One type employs a heat-sensitive member, such as a thermostatic strip or a thermometric bulb with an expansible liquid. This member is exposed to the source of heat and in turn operates an electric contact to energize the fuel - supply valve, or it might act directly upon such a valve to maintain the fuel flow to the burner so long as heat is radiated from the flame to the thermally sensitive portion of the apparatus.

Another type employs a thermocouple, essentially two dissimilar metals welded together to form a junction which, upon being heated, produces an electric current flow in a low-resistance magnetic valve. The valve is manually opened and maintained open while the thermo-junction is heated by radiation from the burner valve.

Objections to these early devices were on the ground that flame failure must allow the thermally sensitive members to cool if the fuel control valves are to be closed and the fuel supply to the burner cut off. In their operation, however, sources of heat other than the flame may impinge upon the thermally sensitive members and maintain the fuel supply valves open for a considerable length of time after flame failure. Radiant insulation in the combustion chamber, burning fuel that may have dripped upon the surface of the burner mounting wall, hot ceramic tips of the burner, and other factors may cause such extraneous heat and react unfavorably upon the instrument.

Flame As an Electric Current Conductor: To overcome these objections, the lesser known ability of a flame to conduct an electric current was employed in a combustion safeguard instrument. An electrode is introduced into the flame and connected to the instrument. As a conductor of electricity, the flame has a definite range of resistance, readily distinguished from that of any other medium. The instrument

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reacts in accordance to the amount of resistance in its electrical circuit, of which the flame is a part. The resistance in the circuit remains within certain constant limits as long as a flame is in contact with the electrode, and the instrument holds open valves in the burner fuel line and maintains combustion. Flame failure, however, increases the resistance in the circuit, and the instrument instantly closes the fuel valve to prevent flow of fuel to an unignited burner. When a burner is being ignited, a pilot light, also in the circuit and in contact with the electrode, provides the necessary resistance in the circuit to enable the instrument to open fuel lines to the burner.

For use with fuels other than gas and which burn with luminous flames, a device incorporating a photoelectric cell is employed in place of the electrode.

Protection Extended to Instrument Failure: Modern combustion-safeguard instruments, after shutting both main and pilot valve upon flame failure, provide a time delay for purging the chamber of combustible gases before lighting is permitted. They are designed for all applications where combustible gases might be present, and purging time is usually fixed at the factory to prevent tempering after they have been installed.

Fig. 1 shows a hookup for gas fuel with provision made for controlled purging of the combustion chamber. No ignition attempts can be made until the air flow switch and the time delay relay indicate the combustion chamber has been purged of all combustible vapors. When purging is completed, the instrument opens the solenoid pilot valve and turns on the ignition spark. The gas from the pilot burner is ignited by the spark, and the circuit is completed when the pilot flame comes in contact with the electrode. The main solenoid valve is then opened, allowing fuel flow through the manual control valve to the main burner, where the gas is ignited by the pilot flame.

After a fixed time cycle, the spark ignition and the pilot burner are shut off. If, for any reason, the pilot burner does not light, or if the main burner fails to ignite from the pilot, the instrument immediately shuts off pilot and main fuel valves and sounds the alarm. A flame failure during operation also shuts down the burners instantly and, after a purging period determined by the instrument and set in accordance to the need of the equipment protected, causes a relight cycle.

It is unsafe to ignite one burner from the other adjacent, especially with large-capacity burners. This makes advisable the use of safety equipment for guarding individual burners against flame failure. Fig. 2 shows how a multiple-burner gas-fired oven or furnace can be equipped with combustion safeguard. Depression of the push button opens the pilot valve and energizes all spark ignition pilot burners through ignition transformers. When the pilot flame touches the flame electrodes, the instruments open the main solenoid valve and the main burners are ignited by the pilot burners. Upon flame failure at any of the burners, the main valve and pilot valve both close and the alarm bell rings.

The combustion safeguard for oil or pulverized coal burning equipment in Fig. 3 incorporates a controller, which can be either a pressurestat or thermostat.

A demand for heat by the controller is transmitted to the instrument, which turns on the spark ignition and pilot burner. When the pilot light strikes the electrode, completing the circuit, the main fuel valve is opened and oil or pulverized coal is admitted to the combustion chamber, where it is ignited by the pilot flame. After a fixed time period, the pilot and ignition are shut off. If the ignition cycle has been satisfactorily completed and the main fuel flame established, the fuel safety valve stays open, held in that position by the photoelectric cell, and the instrument ignition control assembly resets itself automatically for a new lighting cycle when required. In the case of flame failure after the ignition period, the main fuel valve is instantly shut off, and a new lighting cycle takes place.

A combustion safeguard for a system burning oil is illustrated in Fig. 4. A similar hookup would be used for pulverized coal. The instrument provides a purging period, during which the hand torch cannot be ignited. After the purging period, the hand torch solenoid valve is automatically opened. The manual valve on the torch can be opened and the torch ignited. When the torch is inserted through the lighting port so that the flame touches the electrode, the instrument opens the main fuel valve. No oil or pulverized coal can reach the burner until a flame is present to light it, and no flame can be introduced into the combustion chamber until the chamber has been purged of all accumulated combustible vapors. The hand torch is withdrawn from the chamber after lighting, and its manual valve is closed. If the fuel has been successfully ignited, the photoelectric cell will react to cause the instrument to keep the fuel valve open. If ignition is unsuccessful, the valve will be shut down and the alarm bell will ring. A flame failure during the operating period causes an instant fuel shutoff, sounding the alarm bell.

A safeguad against explosions which might result from failure of any part of a combustion safeguard instrument or a short circuit is provided, and the device then closes fuel valves as it does in case of flame failure. In this manner, the instrument protects not only against human failure but also against any deficiency that might develop in the instrument itself.

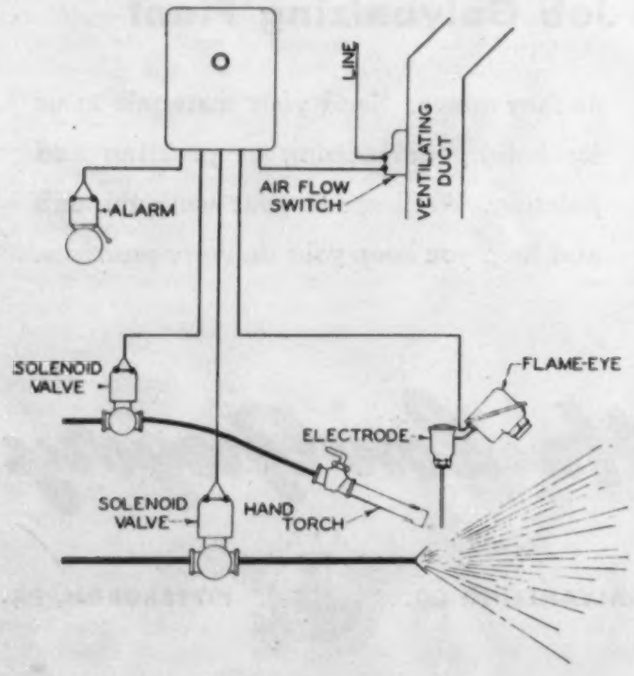

Fig. 4—This setup, suitable for a system burning oil or pulverized coal, includes a purging period before ignition and automatic fuel shutoff in case of flame failure during the operating period

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User Report No. 8 on Experience with . . . .

By BLAINE B. WESCOTT
Gulf Research & Development Co.
Pittsburgh

NE (National Emergency) ALLOY STEELS

. . . . in the oil-well drilling and equipment industries

EXPERIENCE of the oil industry in the use of NE steels for oil well drilling and producing equipment unquestionably is considerably less extensive than that of other industries for several reasons. Early in the national emergency, the Office of the Petroleum Co-ordinator issued an order limiting the spacing of oil wells to one well for each 40 acres and of gas wells to one well for each 640 acres. These spacings are wider than those commonly used previous to the order and, as intended, curtailed the drilling of wells.

In 1940, there were 30,040 oil and gas wells drilled in the United States. This figure for 1941 increased to 32,140. During the first half of 1942 there were only 9392 wells drilled in this country. It has been estimated by the Office of the Petroleum Co-ordinator that approximately 19,000 wells will be drilled this year—a decrease of approximately 40 per cent compared with 1941. A further curtailment of 20 per cent is planned for 1943.

Another reason for the limited experience of the oil industry in the use of NE steels is the fact that until very recently the priority allotted to drilling and production equipment was A-8. In the face of heavy demands for steel for more urgent uses, this priority was not high enough to allow more than very limited production of oil well equipment. Consequently, the manufacture of oil well drilling and producing equipment has been at a virtual standstill for several months. The large productive capacity of the manufacturers of oil well equipment has been converted effectively to the manufacture of a wide variety of vital war items.

The service conditions imposed on oil well drilling and producing equipment are severe. The machinery used for drilling a deep well must be heavy to withstand the high loads but, at the same time, it must be portable and capable of rapid assembly on foundations that are hardly more than temporary. Therefore, both weight and size are important design factors. Vibration that is excessive is to be expected. Too, it is impossible to provide adequate protection against the weather, particularly blowing sand.

Power generated at the surface must be converted to work far below the surface by the drill pipe, which functions as a drive shaft often more than 10,000 feet long. Similarly severe conditions are common in the operation of producing equipment. Consequently, safety factors are unusually low and alloy steels are regarded as essential.

Prior to the NE steels, there were approximately 36 different alloy steels of 20 different base compositions used for the principal items of oil field equipment. Substitute NE steels selected from the first NE steel list, including the 4000 series, reduced the number of alloy steels required to 26 specifications of 15 different base compositions. At the present time, the subcommittee on Oil Tools and Drilling Equipment is completing the work of selecting substitute steels from the latest NE list, and it is certain that an appreciable reduc-

TABLE I—Composition of NE and Prewar Alloy Steels Used for Tool Joints

Steel	Heat	Carbon	Manganese	Nickel	Chromium	Molybdenum
		Composition — Per Cent				
NE-8744	D	0.43	0.84	0.58	0.54	0.22
	E	0.42	0.87	0.53	0.57	0.25
A-4142	H	0.42	0.96	....	1.10	0.23
	I	0.43	0.95	....	1.03	0.20
	J	0.44	0.90	....	1.00	0.20
NS-4245*	K	0.43	0.83	1.35	0.82	0.20
	L	0.44	0.87	1.28	0.69	0.15
	M	0.44	0.80	1.30	0.75	0.15
	N	0.45	0.83	1.29	0.71	0.18

* Manufacturer's designation

TABLE II—Comparison of Full-Hardening NE and Prewar Alloy Steels As Used for Tool Joints, Rock Bit Parts, Reamer Bodies and Subs

Steel	Heat	Yield Strength (psi)	Tensile Strength (psi)	Elongation (% in 2 in.)	Reduction of Area (%)	Brinell Hardness	Izod Impact Strength (ft. lb.)
NE-8339	A	132,000	144,000	20.0	56.8	311	50
NE-8739	B	113,500	138,500	18.0	58.3	311	60
NE-8744	C	100,000	138,500	17.5	57.5	301	..
NE-8744	D	118,000	137,500	15.5	54.8	321	19
	E	126,200	148,500	16.3	57.0	321	34
	E	126,800	145,800	14.0	56.8	321	52
A-3140	F	141,000	156,000	17.0	54.1	321	39
A-4140	G	150,000	160,000	18.0	54.9	321	44
A-4142	H	131,200	152,300	–17.0	56.5	332	31
	H	132,500	150,600	14.5	55.0	332	39
	H	132,900	149,300	17.0	56.8	332	52
	H	140,000	156,700	16.5	56.5	332	45
	I	126,600	144,600	16.8	60.5	321	62
	I	128,700	146,600	15.8	59.0	321	55
	J	132,800	151,200	18.5	58.0	321	49
	J	136,800	155,200	18.8	55.5	321	46
NS-4245	K	144,800	160,000	17.0	53.0	332	43
	L	142,000	155,400	17.5	55.0	321	42
	M	142,300	156,400	17.0	55.0	332	44
	N	140,400	154,200	17.5	55.0	321	49

TABLE III—Comparison of Core Properties of Carburized NE and Prewar Alloy Steels As Used for Parts of Rock Bits for Oil Well Drilling

Steel	Yield Strength (psi)	Tensile Strength (psi)	Elongation (% in 2 in.)	Reduction of Area (%)	Brinell Hardness	Izod Impact Strength (ft. lb.)	McMullan Case Strength (psi)
NE-8024	131,500	156,000	14.5	40.6	302	24	. . . .
NE-8124	127,500	159,000	15.0	49.5	293	25	307,500
NE-8422	141,000	150,500	18.0	54.5	321	45	249,000
NE-8630	127,500	144,000	20.0	63.2	293	66	241.000
NE-8617	130.000	154,500	16.5	60.1	311	65	.
NE-8922	125,000	158,000	18.0	54.1	321	..	365,000
A-3115	115,000	137,000	18.5	50.8	302	54	.....
	117,500	138,500	19.0	49.0	302	55	.....
	130,000	143,000	17.0	46.3	311	32	.....
A-4815	120,000	151,000	19.0	61.0	321	44	.....
	125.000	143.500	18.0	61.5	311	52	.....
	135,000	157,500	19.5	60.0	321	47	.....
	129,000	140,000	20.0	58.5	321	48	.....

SABOTAGE... *from the air*

Sharp...jagged...destructive! Not bombs. Merely little specks of dust . . . but far from harmless, as high-powered microscopes would show.

It is easy to imagine what damage these hard, jagged particles can do to precision finished bearing surfaces in equipment ranging from delicate instruments to heavy machines. When a highly finished part must be scrapped because of dust-damage, much more is lost than just a piece of metal. Many hours of expensive, painstaking labor are completely wasted.

One of the best defenses against dust-sabotage is air conditioning . . . the specially designed kind of air conditioning which, through efficient air filtering and accurate control of temperature and humidity, is making possible precision tolerances never before attainable.

General Electric has taken an outstanding part in the development of this new air conditioning. Already, the war has taught us how to make equipment more compact, more flexible, and far more efficient. Required "climates" are faithfully reproduced. When the war is over, air conditioning...better, cheaper, more universally used...will do much to make the world of the future happier and more useful for everyone. Then, as now—General Electric will be a leading source of all kinds of air conditioning.

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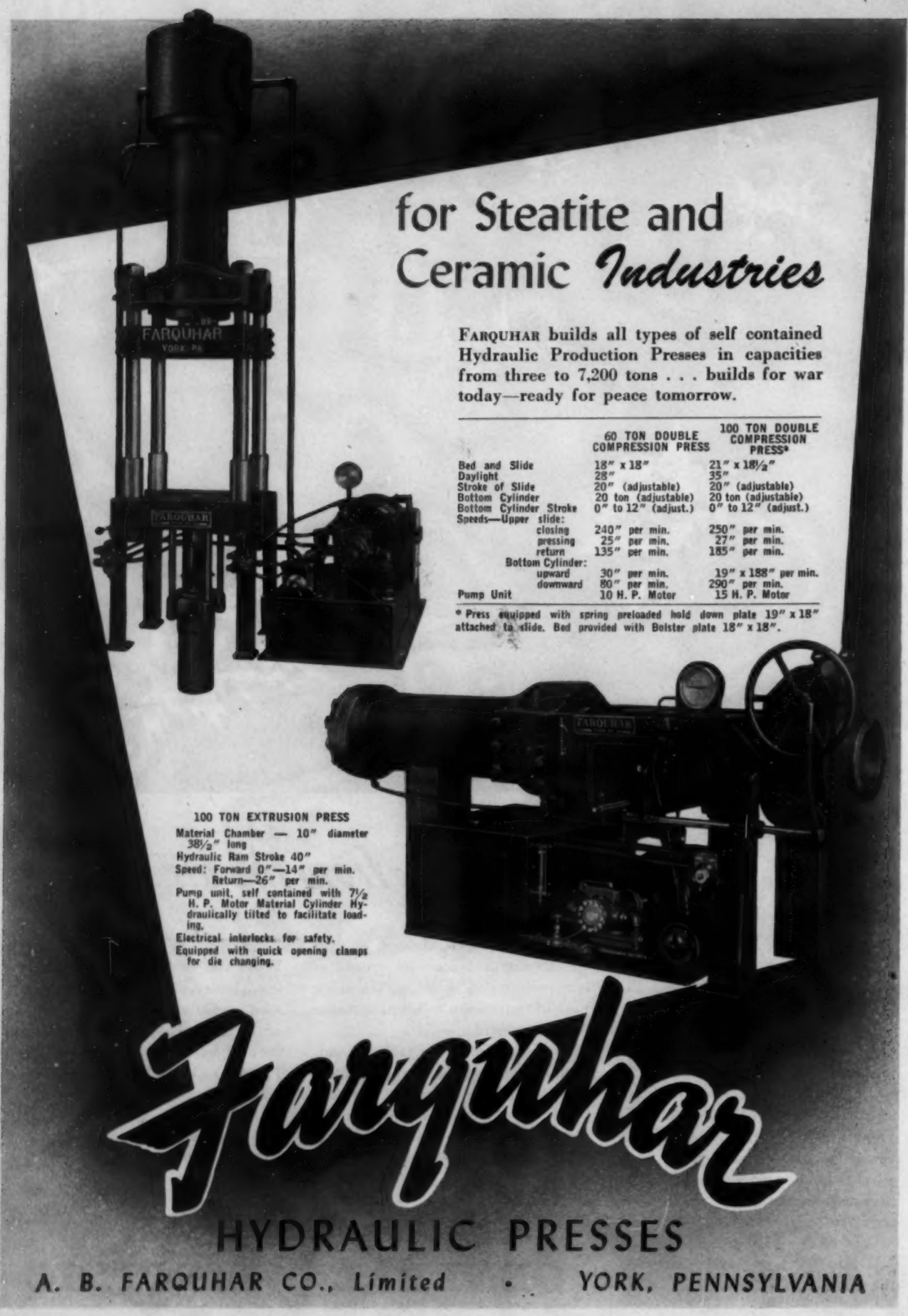

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	60 TON DOUBLE COMPRESSION PRESS	100 TON DOUBLE COMPRESSION PRESS*
Bed and Slide	18" x 18"	21" x 18½"
Daylight	28"	35"
Stroke of Slide	20" (adjustable)	20" (adjustable)
Bottom Cylinder	20 ton (adjustable)	20 ton (adjustable)
Bottom Cylinder Stroke	0" to 12" (adjust.)	0" to 12" (adjust.)
Speeds—Upper slide: closing	240" per min.	250" per min.
pressing	25" per min.	27" per min.
return	135" per min.	185" per min.
Bottom Cylinder: upward	30" per min.	19" x 188" per min.
downward	80" per min.	290" per min.
Pump Unit	10 H. P. Motor	15 H. P. Motor

* Press equipped with spring preloaded hold down plate 19" x 18" attached to slide. Bed provided with Bolster plate 18" x 18".

100 TON EXTRUSION PRESS

Material Chamber — 10" diameter 38½" long
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Speed: Forward 0"—14" per min.
Return—26" per min.
Pump unit, self contained with 7½ H. P. Motor Material Cylinder Hydraulically tilted to facilitate loading.
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tion in the number of both individual specifications and base compositions will be accomplished.

Several large manufacturers have had no experience whatever with NE steels. Others have, thus far, been unable to obtain them and have been compelled to continue with the pre-war steels for such limited amounts of equipment as it was possible to manufacture. During the past six months, the experience of one manufacturer from the fabrication of a total of 7500 tool joints indicates that NE-8440 is a very satisfactory substitute for the SAE-3140 previously used. A second manufacturer has had a similarly encouraging experience from the production of more than 5000 tool joints made from NE-8739 and NE-8744 as substitutes for A-3140 and A-4140.

A majority preference for the NE-8700 series over the NE-8400 series steels has been expressed for this application, but it may be concluded at least tentatively that either series will afford adequate substitutes for tool joints. Composition of two heats of NE-8744 and several heats of pre-war alloy steels are given in Table I. Typical physical properties for these heats, together with other heats of full-hardening NE steels are given in Table II. Most of the physical property data relate to tool joints, which are generally heat treated to give a hardness within the range of 285 to 335 brinell.

NE-8739 and NE-8742 have also been substituted successfully for SAE-3140, A-3140, A-4140, NS-4245, A-3141, and A-4142 for drill collars, kellys and subs. It is the general opinion of this group at present that the medium carbon grades of NE steels in the 8400, 8700 and 8900 series will provide adequate substitutes for the pre-war steels. No difficulty in attaining comparable hardening has been experienced.

During the past four months, one of these manufacturers has produced 3000 rock bit parts from NE-8420. This substitution for SAE-4815 has given satisfactory results in 85 per cent of the cases. A comparison of the physical properties of the cores of several NE and pre-war alloy carburizing steels is given by the data in Table III. From these data, it appears that the NE steels with higher alloy contents provide somewhat greater impact strength. Thus where severe service is encountered, they are preferable to the steels of the NE-8000 and NE-8100 series. Experiments, admittedly inconclusive as yet, have led one manufacturer to conclude, however, that no NE grade can be substituted for the higher nickel-molybdenum prewar steels *for carburized parts with sharp cutting edges* without entailing some reduction in service life of the cutters. For such usage, the NE-8700 and 8800 series are preferred to the other NE carburizing steels, but it is believed that the non-nickel bearing A-4119 would be better yet.

Engineers, both of the oil industry and of the equipment manufacturers, are practically unanimous in believing, however, that sucker rods for heavy pumping loads under sulfide corrosion conditions cannot be made of any NE steel without incurring a considerable reduction in durability. Years of experimentation and experience have proved conclusively that there is no entirely suitable substitute for the nickel content of SAE-4615 and higher nickel steels that were used for this service.

In this application it is not a problem of obtaining certain ordinary physical properties. Rather, it is a problem of equaling the resistance to sulfide corrosion fatigue in the absence of oxygen which is imparted by a nickel content of 1.5 per cent or more. No other alloy or combination of alloys has yet been found which equals nickel in such service. Fortunately, the tonnage of steel which is required for sucker rods of this grade is comparatively small.

At the present time, the Subcommittee on Oil Tools and Drilling Equipment is completing the selection of substitute steels from the revised list and experimenting with them as rapidly as they can be obtained. There is no experience to report as regards the suitability of the NE-9200, 9400, 9500 and 9600 steels, but some skepticism has been expressed relative to their welding characteristics because of the high content of silicon. The conversion to NE steels will be complete by the time they are available generally and when the manufacture of oil field equipment can be resumed. This industry is fortunate because it will have the benefit of the greater experience of other industries when this time arrives.

For the information in this progress report, the writer is indebted to the members of the Technical Advisory Subcommittee on Oil Tools and Drilling Equipment, and particularly to M. T. Archer, chairman; C. R. Shapiro, Reed Roller Bit Co.; and R. L. Adams, National Supply Co.

STEEL WIRE SHIELDS WAR PLANTS FROM LIGHTNING

DEFLECTING lightning driving earthward at more than 11,000,000 miles per minute, this steel wire "umbrella" shield developed by Dr. Gilbert D. McCann, Westinghouse Electric & Mfg. Co. engineer, already is being used to protect some war industries and one huge ordnance plant. Its effectiveness is shown above. Shield simply consists of a wire strung above building to be protected and anchored on tall wood poles at each end. Wire is connected to steel rods buried in the ground

By G. ELDRIDGE STEDMAN

IDEAL SALVAGE SETUP

. . . . utilizes exceptionally efficient materials handling system in disposal of machine tool cuttings

THE ENGLISH have a word for it—*swarf*. It represents all the varied chiselings from the machinist's tool. All the burly, bushy turnings, chips and shavings that are turned, bored, drilled, planed or cut away when machining are known as swarf, as distinguished from all other forms of metal scrap that may come from rejection on inspection, failure in service, obsolescence or similar factors.

This swarf is valuable stuff. On certain items, considerably more than half of the original material is cut away during machining operations. When this material is alloy steel, it is easy to realize the immense importance of returning every possible ounce of its precious elements back into service. But before it can be charged into the open-hearth furnaces to help make more steel, this material must be carefully segregated according to alloy content, collected and processed for charging. To be of most value, it must be carefully guarded against contamination with swarf of another type alloy content. With 10 to 30 or more alloys in one plant, this immediately involves a materials handling problem of no mean proportion for the handling must be efficient if the salvaging is to be done on a profitable or a break-even basis.

Salvaging swarf is thus a mighty important function and an intricate one where there are so many varied metals and alloys being used. Due to the extreme importance of proper segregation at the source, the government has recently directed that all swarf must be segregated into specified classifications and if possible returned for remelt to the supplying smelter.

There is probably no better place to study an efficient technique in salvaging swarf than at the Packard Motor Car Co., Detroit. Not only are its machining operations unusually varied, but since Packard Aircraft Engine and Marine Motor Divisions have separate accountabilities to varied branches of the United States, British and Allied military services, exacting accounting procedures must be used which could easily complicate the task of handling the swarf.

Chairman of Packard's salvage and scrap committee is A. H. Grossman. Able manager of the salvage department is Jake Hammerl, under whose direction E. W. Hammond, Arthur Grenier and John Bausano supervise the activities of 55 department employes, who are busy around the clock and throughout the entire square mile of Packard's immense plant. Hammerl originated the Packard swarf salvage plan, and his staff members have done a good job installing it. They have made the complicated simple. The system has proved amazingly effective, though in operation only a short time.

Packard produces the famed Rolls-Royce engine that powers such bombers and fighters as the Spitfire, Lancaster and Curtis P-40F. Likewise, early adapting its aircraft engine to marine purposes, it was first to power the PT mosquito and torpedo boats and now supplies better than 95 per cent of such engines. The all-Navy "E" brassard whips proudly above the Packard plant. Within, Packard craftsmen long known for their precision production work busily at 5700 machines of every conceivable variety, turning aside all manner of swarf.

The Packard swarf salvage function is appreciated when it is realized that there are 10 metal segregations involved in the production of the marine engine and 13 such essential segregations in aircraft engine swarf. Nickel, molybdenum and chromium steel alloys as well as brass and bronze, carbon steel, aluminum bronze and aluminum are among the 23 metals and alloys that have to be individually separated in relation to five groups covering parallel and distinct segregation for the two divisions.

The control is by colored tags, Fig. 1, each separate classification of metal having its own color. The divisional segregation is symboled by a "Y" to cover the groups involved in marine engine

production. These identification tags follow the swarf from the machine which produces it, on through the crushing, briquetting, weighing, shipping and accounting operations. Thus, the flow of swarf from 5700 machine tools and covering 23 specific metals and alloys is kept classified, properly segregated and accounted for accurately.

Whenever a new job is set up on any milling machine, drill press, lathe, planer, shaper, thread grinder or other tool, the job setter in the department tags the machine with the color corresponding to the metal specified on the blueprint to be used. He is followed by the scrap process man, who checks every machine to see that the right tag has been affixed. For example, aircraft aluminum AMS 4118 carries a red tag; aircraft carbon steel AMS 5024 is green; marine aluminum A755A is orange; marine brass and bronze A821 are blue.

From this point on, all tote pans, chip buggies, departmental V-dump trailers and salvage bins which handle material from that machine are all tagged with

Fig. 1—Here Jacob Hammerl, manager of Packard's salvage department, discusses planning details of swarf salvage segregation with his assistants, E. W. Hammond, left, seated, and Arthur Grenier, standing. Chart of colored tags represents the 23 differently colored tags used in segregation system

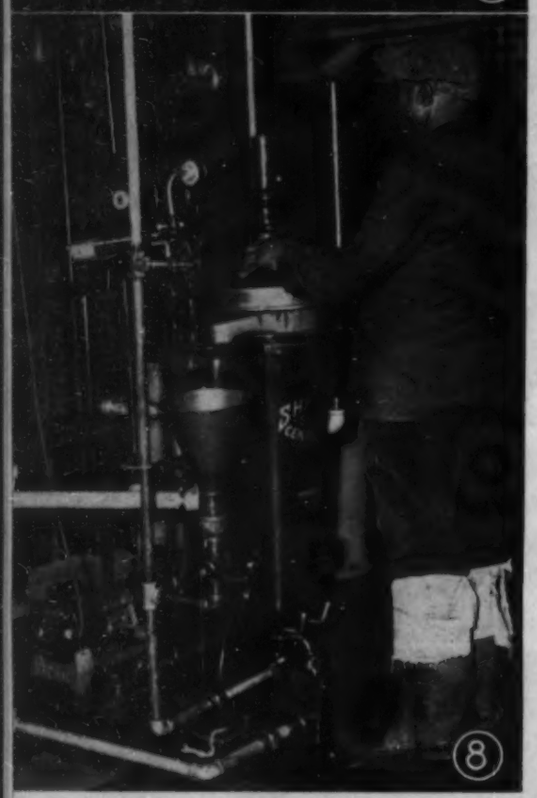
Fig. 2—One of seven swarf stations throughout the plant—points at which swarf is accumulated. Each trailer is tagged for a separate classification of metal or alloy

Fig. 3—Aluminum turnings from departmental chip buggies (left) are loaded into V-dump trailer units. Note colored tags on both chip buggy and V-dump trailer

Fig. 4—A closeup of one of the steel skid boxes mounted on wheels at left with one of the V-dump units at right. To dump, latching bar is let down on end, bucket is rolled to either side. V-dump holds 900-pound load of swarf

Fig. 5—V-dump units are easily assembled into trains of four to six trailers for transport to crusher building

Fig. 6—Swarf from V-dump units is conveniently spilled from street level platform shown here into swarf pits in crusher building. Operator is preparing to dump one of the trailers here



that particular control color. Though all machines in some Packard departments (such as the crankshaft) tend generally to work constantly in one metal, other departments may have machines working on many different metals. Here the varied colored cards above the long rows of closely arranged machines give the department a "Christmas tree" appearance. Yet, by this color system segregation is so simple it is almost automatic. Not a pound of metal is misplaced. And that is the first requirement of an effective salvage system.

Each department is responsible for handling its swarf from the machine tool to the station where the V-dump trailers are located for that department. See Fig. 2. Chip men make their regular rounds in each department, transporting and dumping color tagged tote pans or chip buggies into the station V-dump trailers, each properly tagged. See Figs. 3 and 4. These V-dumps hold about 900 pounds of swarf. From there on, the salvage department takes over responsibility. A crew of seven scrap process men is maintained by the salvage department to follow up all departmental salvage activities, to double-check segregation and to see that machines are tagged right at all times.

The V-dump trailers are accumulated into trains of from four to six cars. A train is being formed in Fig. 5 where two cars have already been picked up.

Like most large manufacturers, Packard Motor Car Co. has had a well organized salvage department for many years. But with the urgent necessity of conserving all critical materials, Packard management quickly appreciated that peacetime methods were inadequate; so with the assistance of officials of the Industrial Salvage Branch, Conservation Division, War Production Board, these operations have been still further refined. The result is a comprehensive procedure for classification and handling of materials vital to the war effort, as analyzed in the accompanying article.

Trains are hauled to the swarf crusher building, a new brick building erected solely for these salvaging operations. It is equipped with two swarf crushers, a steel briquetting machine and an oil purifying system. This building has two swarf bins, one for aluminum and the other for steel. Steel is briquetted here, but the aluminum is removed to another building after crushing and binned as later described.

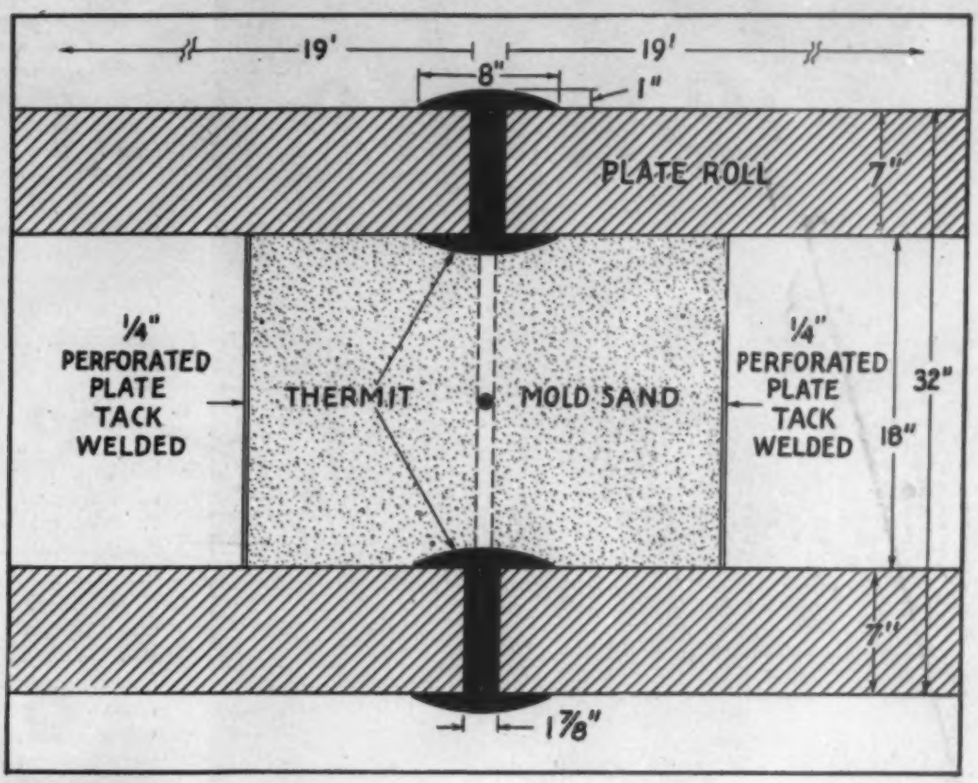
The steel swarf bin holds approximately 35 tons and the aluminum, 10 tons. The swarf load from each V-

Fig. 7—Feeding steel swarf into hopper mouth in one of swarf bins in crusher building

Fig. 8—Handling facilities include efficient oil reclaiming system. Centrifuge shown here is part of oil purifying system in Packard's swarf salvage building

Fig. 9—Hydraulic briquetting machine in operation. Note overhead feeding facilities

Fig. 10—Briquettes are hoisted to top of this tower alongside salvage building, then are discharged into any one of several handy highway trailer units or gondolas



Cross-section of plate roll showing Thermit weld.

One half of a plate roll as received from the foundry.

HUGE PLATE ROLL

fabricated with

THERMIT WELDING

A PLATE ROLL, 38 ft. long by 32 in. in diameter, cast in one piece, would present a problem these days—even to foundries that have the capacity. An alternate method, recently used, proved highly successful. It involved casting the roll in two pieces and Thermit welding them into the required length. When the roll was finished, machined and polished, it had the appearance and durability of a single casting.

Tests have proven that a Thermit weld is even stronger than a casting of the same cross-section, and, as preparatory work is brief and stress relieving is unnecessary, comparatively little time is required for the process.

In addition to the fabrication of large units, Thermit welding is being used extensively for the repair of all kinds of heavy equipment. The speed of the process in cutting machinery shutdowns to a minimum is a vital consideration.

Write for booklet "Thermit Welding." It contains many examples of how Thermit welding may be utilized to salvage broken parts and fabricate large units.

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dump is weighed before crushing, one copy of the weigh receipt being given to the accounting department and the other to the group leader of the crushing detail. The crusher and briquetting machine must be entirely cleared of one tagged type of swarf before a batch bearing a differently colored tag can be processed. Thus, sufficient V-dump load is accumulated of one color to make the crushing operation economical before that particular batch is processed.

Swarf bins are two parallel pits, about 8 feet deep, with a platform side door through which the V-dump trailers can be spilled conveniently from a street level platform. See Fig. 6. At their backs, a hopper mouth receives the swarf shoveled in by the crew. See Fig. 7. Feeding into the side of the hopper, the shoveled swarf falls on the rotor of the crusher and is reduced to small chips. The hopper mouth is closed by a flap that gives easily as the swarf is shoveled against it but prevents swarf from rebounding during the crushing operation. Since the crusher rotor revolves at about 500 to 900 revolutions per minute, without this flap some of the swarf might be flung out, endangering workers.

Coolants are used extensively in all cutting operations. Despite the fact that most machines have some sort of strainer in their pans, a large amount of coolant still clings to the swarf. This must necessarily be separated from the swarf during salvaging. Both the aluminum and the steel swarf bins have sumps into which the oil drains. The aluminum is then transported to bins in another building, which likewise are equipped with sumps. However, the steel remains in the crusher building, where it is briquetted.

The oil in the pit sumps is pumped up to an oil station on the third floor of the swarf building. There it passes through heaters, is refined in high-speed centrifugal separators and is conducted into a large storage tank. Most of the coolant is refined and recovered for use in this purifying system. The sludge residue is marketed outside the plant. Fig.

(*Please turn to Page* 80)

Fig. 11—*Modified coal conveyor speeds loading of aluminum swarf into high trucks. Colored pennants at bins agree with tags indicating classification*

Fig. 12—*Washing machine, left, and rag dryer, right, handle* 1200 *pounds of rags daily*

Fig. 13—*Special trailer units designed for handling of waste paper to baling station*

the light metal age is born . . .

The Stone Age, the Bronze Age, the Iron Age, the Steel Age — these four great ages span the history of man.

Today, we are at the dawn of a fifth. Out of this war, the greatest conflict the world has ever known, the Light Metal Age is being born.

Magnesium is one of the lightest metals known. One pound will do the work of one and one half pounds of aluminum and five pounds of copper, and magnesium alloys have been developed with an ultimate strength of more than 60,000 pounds per square inch.

Before the war there was only one magnesium and one aluminum producer in the United States . . . after the war there will be as many as ten magnesium producers and four aluminum producers! What's more, these metals are among the most abundant of all, and full production should reduce the prices of both to levels never dreamed of before.

Likewise in steel, in just two war years our capacity for electric-furnace steel has increased an incredible 85%, and new lightweight superstrength alloys have been developed which can now be welded, with great savings in costs and time.

What does all this mean to the post-war world just ahead? It means that aircraft, automobiles, trucks and trains will be lighter, stronger and cheaper. It means that rivetless ships will slide off the ways, and rivetless planes will roll off the lines. It means greater speed and lightness and strength and economy.

And it means *problems!* Problems in production, in fabrication, in tooling and in design. Problems in the new light metals of the new Light Metal Age!

Bryant engineers are among the foremost authorities in America on problems involving machine tool operations with the new light metals. Send us *your* problems now!

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★★ Kaiser's Plant

AN $85,000,000 Axis "headache" is assuming realistic and expansive proportions among the orange and lemon groves of Southern California. It is the large iron and steel plant, sprawling over an area of some 1200 acres which Kaiser Co. Inc., of Oakland, is erecting near Fontana—the first plant of its kind to be constructed on the Pacific coast.

And herein lies the cause of the "headache" for America's foes:

When the mill is finally completed and is operating full blast toward the end of 1943, it will produce 675,000 tons of steel ingots and about 472,000 tons of steel products annually. But, a major portion of the plant will be turning out thousands of tons of steel for war industries long before that time. The 1200-ton blast furnace was blown in Dec. 30, marking the initial operation of the new plant.

The plant, as originally conceived was to have cost in the neighborhood of $59,000,000. Work on this phase of the war enterprise was started several months ago and is scheduled to be completed during the early part of 1943. These facilities will have a capacity of 432,000 tons of pig iron, 450,000 tons of ingot, or 300,000 tons of steel plate, annually.

It was only recently that expansion of the size of the plant was decided upon. On Oct. 24, 1942, Donald M. Nelson, chairman of the War Production Board, announced in Washington, that Kaiser Co. Inc., had been granted an additional $26,000,000 to increase the Fontana plant's capacity by 225,000 tons of ingots.

The facilities to be added include two basic open-hearth furnaces with a capacity of 185 tons each; a 28-inch structural mill served by a 36-inch breakdown mill; a merchant bar mill; alloy finishing facilities, and slow cooling pits.

Ingots of standard sizes and shapes of approximately 5000 to 12,000 pounds each will be produced. The announced expansion includes a further extension of ingot moldmaking capacity.

The addition of the two open hearths will permit the Kaiser Co. to make full use of all pig iron produced in the 1200-ton blast furnace.

The larger part of the total output will be in those products most suitable for shipbuilding, although the present expansion contemplates the possibility of some alloy steel manufacture.

Production of the mill already under construction will consist entirely of steel plates. When the added facilities are in operation, the plant will produce, in

From an article in the December 1942 issue of *Pacific Factory*.

Initial

addition, structural shapes and some amounts of other carbon steel merchant products.

Iron ore for the blast furnace will be supplied from Southern California desert deposits. Coal will be obtained from the mines in Utah, while limestone will be supplied from quarries only a few miles from the Fontana plant.

The plant will consist of a 1200-ton blast furnace, four 185-ton stationary open-hearth furnaces and one 110-inch, 2-stand tandem plate mill.

The center of the plant is the blast furnace. The by-product coke plant is located northeast and the raw material handling area northwest of the blast furnace. The open-hearth plant is immediately south of the blast furnace. Provisions were made at the outset, however, for expansion in an easterly direction of the blast furnace facilities. The soaking pit and the plate mill building are southwest from the blast furnace. The steam power plant is between the blast furnace and the open-hearth building, the service buildings and administrative building being southeast of the open-hearth plant.

The raw material handling consists of storage facilities, crushing, screening plants, ore bedding system and a sintering plant.

With the exception of the sintering plant the capacities of the rest of the installation are such that the entire daily requirement of one 1200-ton blast furnace can be conveyed into the stock house bins during one eight-hour shift.

The sintering plant consists of one 72-inch wide, 102-foot long sintering machine, designed by American Ore Reclamation Co. The nominal capacity of this plant is 1500 gross tons of dry sintered product from a suitable mixture of iron ore and flue dust. The plant building has provisions for the installation of a second sintering machine.

The entire ore sintering system is designed for the sintering of approximately 450,000 tons of fine ore per annum on the basis of continuous operation, and includes equipment and facilities for handling and proportioning of ore, flue dust, scale and coke breeze.

The ore receiving, crushing, screening, storing and reclaiming systems are designed for the handling of approximately 833,000 tons of ore per year based on a working day of eight hours. Finished storage piles are laid out so that 10 days supply of material will be on hand at any time.

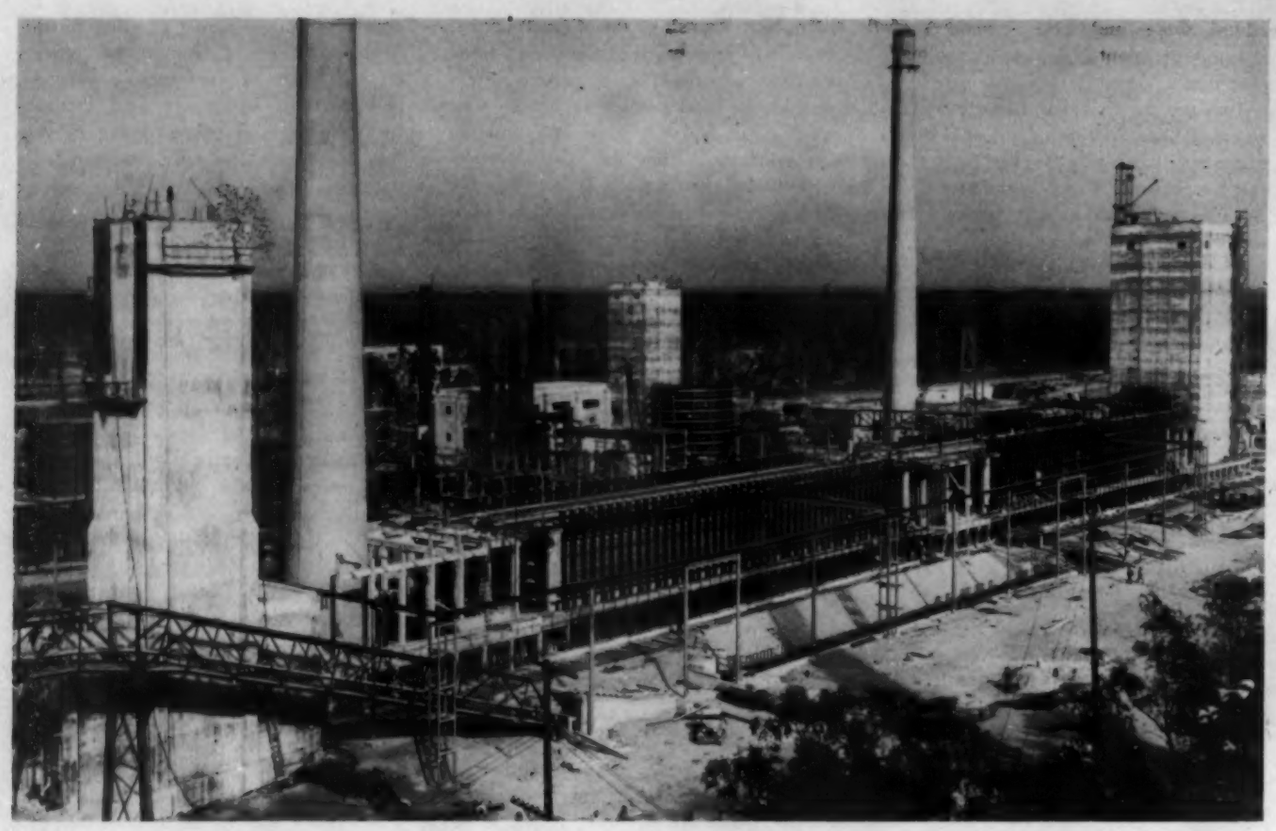
In order to equalize the physical and chemical characteristics of the ores, a Robins Bedding System will be installed. The bedding system consists of four piles of approximately 12,000 tons capacity each.

The by-product coke plant consists of 90 Koppers Becker type under-jet

Begins Operation

Open-hearth furnaces looking toward tapping side, extreme left. This shop will include six 185-ton units when completed

Twelve-hundred-ton stack in process of construction, below. The stack was blown in Dec. 30



Two batteries of 45 Kopper-Becker type by-product ovens as they appeared Dec. 1

compression by-product coke ovens, arranged in two batteries of 45 ovens each. Each oven has an average width of 14 feet ¼-inch and a length of 40 feet 5½ inches and has a capacity of 14.4 net tons of coal. The normal carbonizing capacity of the batteries based on 18 hours coking time, is 1728 tons of coal per day, producing 933 net tons of coke.

The ovens will be heated by underfiring with coke oven gas or blast furnace gas, or a combination of these gases.

Important by-products will also be obtained during the coking process. These products will include creosote, pitch and heavy residue oils, benzol, a basic ingredient for synthetic rubber and used in the production of high-octane aviation gasoline; toluol, a basic element of high explosives; xylol, an ingredient for paints and lacquers; sodium phenolate, from which carbolic acid is derived, and sulphate of ammonia, a soil fertilizer.

These by-products can also be broken down to the point where they produce such consumer items as aspirin and the new sulfa drugs such as: sulfanilimide, sulfathiozol, and sulfapyradine. In brief, the products will form a large industry in themselves.

The 1200-ton blast furnace was blown in Dec. 30, 1942. Its height above the center line of the iron notch to the top of the deck ring is 97 feet 6 inches. The diameter of the bosh is 28 feet 3 inches, and the hearth diameter, 25 feet 6 inches.

The three stoves, designed by the William M. Bailey Co., Pittsburgh, are 25 feet diameter and 115 feet high.

Concrete slag pits are provided alongside the blast furnace. Slag will be reclaimed by means of an electric shovel, loaded into railroad dump cars and hauled to a slag dump, or to other final disposal.

West of the blast furnaces is located a double strand pig iron casting machine. This machine furnished by the Pittsburgh Coal Washer Co. is 168 feet long from center to center of sprockets. Thirty to 60-pound pigs may be cast.

Air for the blast furnace is supplied from an Ingersoll-Rand turboblower. At full load this unit handles 100,000 cubic feet of free air per minute and delivered at a gage pressure of 30 pounds per square inch. Two blowers are provided, one of them as a standby. They are installed on the main floor of the power house with their steam condensers located directly underneath the basement.

The steam required for the turboblowers and other uses is generated in Babcock and Wilcox boilers. Two boilers are provided, each capable of generating 115,000 pounds of steam per hour at a pressure of 425 pounds per square inch gage and a total temperature of 700 degrees Fahr. measured at the superheater outlet.

The open-hearth plant consists of four 185 net ton capacity furnaces and all the required auxiliary equipment. The furnaces are of the stationary type and have a magnesite hearth with sloping backwall and five doors for charging materials. Normal producing capacity of each furnace is 115,000 net tons of steel ingots per year.

Hot metal will be transported from the blast furnace in 150 gross ton capacity Treadwell ladle cars. It will be poured into 100-ton hot metal ladles and transported to the furnaces by a 125-ton hot metal crane. The pouring building is served by two 250-ton capacity steel ladle cranes.

Four 2-furnace batteries of Amsler-Morton recuperative soaking pit furnaces will be provided, and serving these will be a crane capable of handling ingots up to 20,000 pounds each.

The plate mill consists of two main units: (1) The breakdown mill is a 2-high, 42 feet x 110 feet reversing mill driven direct through two 3500-horsepower direct-current motors, and (2) the finishing mill is a 3-high stand 24 inches and 38 inches by 110 inches driven by a 7000 horsepower direct-current motor

(*Please turn to Page* 94)

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Salvage at Packard

(*Continued from Page 74*)

8 shows one of the centrifuges, part of the purifying system.

After crushing, the swarf is raised aloft by two vertical conveyors and dumped into large hoppers. From these the aluminum goes to a separate building, and the steel remains to be fed into a briquetting machine.

A Milwaukee hydraulic briquetting machine, Fig. 9, is used. The briquettes produced are 5 inches in diameter and weigh about 10 pounds each. From the briquetting machine, a belt conveyor carries them to a chute, from whence they are dumped into large motor truck trailers for shipping to the smelter. See Fig. 10. Before the present practice of segregation, this chute dumped directly into railroad cars on a siding by the swarf building. Now the classified accumulations require a line-up of trailers to accommodate the segregated loads, each trailer having its own color corresponding to the color assigned that particular type of swarf. The loading chute is designed to be swung easily from one trailer to another so that the crusher can handle a sequence of different materials each day.

Crushed aluminum swarf is trucked to another building, where it is accumulated in a row of bins to accommodate each colored batch. See Fig. 11. A gravity sump system runs under these bins, centralizing the draining of coolant for return to the swarf building for refinement.

"Aluminum chips are shipped loose," reports A. H. Grossman, chairman of Packard's salvage and scrap committee. "We emphasize that the crushing of aluminum chips has reduced our need for chips on a clean and dry basis, and each weight is certified. At present we are segregating eight important alloys of aluminum, five classes of brass and bronze borings and turnings, and five classes of steel chips which are sold in briquette form. High-nickel steel alloys are separated from molybdenum and delivered to the mills in separate form. The range of nickel steel runs from 1 to 11 per cent."

Swarf Trucked to Smelters

Mr. Hammerl has ingeniously adapted a Fairfield conveyor-type coal loader with a conveyor belt 14 inches wide and about 20 feet long so it can be used in loading aluminum swarf from these separate bins into trucks for highway transport. This material is sold to approved smelters, the attempt being to return it to customer material accounts. Shipments are made by truck to smelters in Chicago, Cleveland and Buffalo. About 3 per cent of the weight is lost in transport. Packard currently receives 9 cents per pound for this aluminum swarf, for a minimum load of 20,000 pounds.

In the aluminum storage building, a rag laundry and drier are also maintained. The Packard plant requires about 2½ tons of rags daily, of which some 1200 pounds are washed in this building. The rest are serviced outside.

For some years, Mr. Hammerl functioned as a corrective engineer about the plant, recommending changes that would conserve expense. He has a great eye for salvage . . . even enjoys salvaging all sorts of motion as is indicated by the many conveyors, hoists and originally designed carting conveniences about the Packard yards and plant. This has much to do with the fact that the materials handling system is so effective.

The management gave him the green light on revamping a derelict section of an unused powerhouse. He converted it into a building where salvage or waste paper is being efficiently handled. To set up this practice, Hammerl first designed a paper truck trailer 3 x 6 feet in dimension and 42 inches deep. Swing covers prevent paper from blowing out. There are 75 of these paper trailer units now stationed throughout the Packard plant. They are assembled into truck and trailer trains on a regular schedule and hauled to the waste paper salvage building. See Fig. 13. There they are dumped by hoist into a depressed bailer.

Paper bales average 1000 pounds in weight. Packard receives $8 per ton. No attempt is made to sort such paper, although empty cartons are segregated for return to the suppliers for refill. These specially designed paper trucks

NOVEL ROD HOLDER SAVES METAL

YEARLY SAVINGS of 60,000 pounds of alloy rods is anticipated at the Cadillac plant, Detroit, by using this novel welding rod holder, developed by Raymond Baugh, welding operator. Made of cold-rolled steel or brass, the adapter comprises a stem which is gripped in the conventional holder, and a backing plate with two studs to which ends of welding rods may be fused lightly. Since rod is not gripped, its entire length may be used and usual 2½ to 3 inches of waste avoided

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have hooks at each end used in conjunction with a unique hoist arrangement on a track. A set ring drops over a flange of the hoisted truck, which then revolves the container, permitting automatic dumping. The bailer has a capacity from 22 to 24 bales each 8 hours.

Mr. Hammerl maintains a large yard where his men sort all refuse, wood and scrap steel, salvaging everything possible. Here, all material that cannot be reclaimed is separated and sold to scrap dealers. If iron or steel, this is loaded on trucks by overhead cranes and magnet. To obtain the last pound of scrap, a man is stationed at the rubbish incinerator to recover rubber, rags, metals, paper and wood. And he has shown a profit.

Scrap Everything Possible

Packard's mechanical division has rechecked all tool and die records, the plant engineering division has surveyed its available material, and the service division has combed its records to enable the salvage department to scrap all car parts beyond the lifetime service point. Old buildings have been torn down to turn their iron and steel into scrap.

Packard has, in addition, scrapped materials, tools and dies, both at its plant and in the hands of its vendors.

The management issued a strict order that no more surplus or obsolete car parts were to be sold to surplus buyers. Thus thousands of dollars worth of parts were mutilated and scrapped, releasing tons of valuable metal to war purposes. So thorough are Packard's salvaging operations that I asked Art Grenier, who had taken me everywhere about the plant, ending up in the pits and the cupola of the swarf building with my shoes very well oiled, whether he didn't want me to squeeze the oil from them before I left.

During the first seven months of 1942, Packard accounting of varied materials was as follows: 2,115,062 pounds of aluminum swarf; 2665 pounds of antimonial lead; 605,976 pounds of brass; 22,806,587 pounds of iron and steel; 9769 pounds of burlap scrap; 8086 pounds of nickel swarf; 1,451,026 pounds of wast paper, 12,435 pounds of waste rags; 32,343 pounds of rubber scrap; 48,621 pounds of scrap solder; 93 pounds of silver trimmings; 78,921 pounds of scrap grinding wheels; 20,775 pounds of scrap zinc.

Packard is overlooking no bet in doing its part to help win the war . . . . if its swarf salvage program is any indication. And well planned materials handling is largelv responsible for the success of this operation.

Windows of Washington

(*Concluded from Page* 35)

oil per day from the Bermejo wells through a pipeline to Argentina. This oil will be refined at the Aguas Blancas refinery.

The government also distributes oil products through its own petroleum trust, the Y.P.F., and sells at retail from its own filling stations at a uniform flat rate in all parts of the nation regardless of the distance of the filling station from the refinery. The price of gasoline is fixed at 23 centavos per liter, unchanged in 11 years. A liter is equivalent to 1.056 quarts and at the rate of 23 centavos per liter would equal approximately 21 cents per gallon in United States money.

The price of a liter of gasoline includes a tax of 3 centavos which is usually allocated to highway improvements. This tax totals about 30,000,000 pesos annually.

Distribution of petroleum products in Argentina is not limited exclusively to Y.P.F. Independent foreign companies, chiefly subsidiaries of the Standard Oil Co. and the Dutch Shell interests also are in the field.

Recently the Argentine legislature considered a proposal to construct alcohol distilleries to manufacture motor fuel from corn, wheat, barley and other vegetable products. This program, if adopted, is intended to furnish a use for surplus corn, as well as the by-products of the wine and sugar industries.

Another plan now being considered to offset the fuel shortage is an exchange of Argentine gasoline and other petroleum products for Chilean coal. The Chilean coal mines are among the richest in South America. Chile needs petroleum while Argentina has petroleum but lacks coal. These plans envisage use of vessels of the Argentine merchant fleet to make the exchange.

Negotiations are also under way between Colombia and Argentina for the delivery to Argentina of 100,000 tons of Colombian coal in exchange for wheat, corn, cotton and other Argentine products. Colombia's coal region is conveniently located near its Pacific port of Buenaventura, and the coal is of good quality.

Steel Cartridge Cases

(*Concluded from Page* 48)

high temperature requires great care and control to avoid any possible variation of the chemistry of the steel that would adversely affect the end product. In other words, steel processed hot must be processed by people with experience in that field. The three manufacturers mentioned have that experience but I think all will agree that it would be unwise to attempt the dissemination of the "know-how" of handling steel hot to industries which do not enjoy experience in that field.

It is too early to discuss the economies of the two methods of producing cups but it is only fair to say that on the evidence immediately available the cold process is the less expensive.

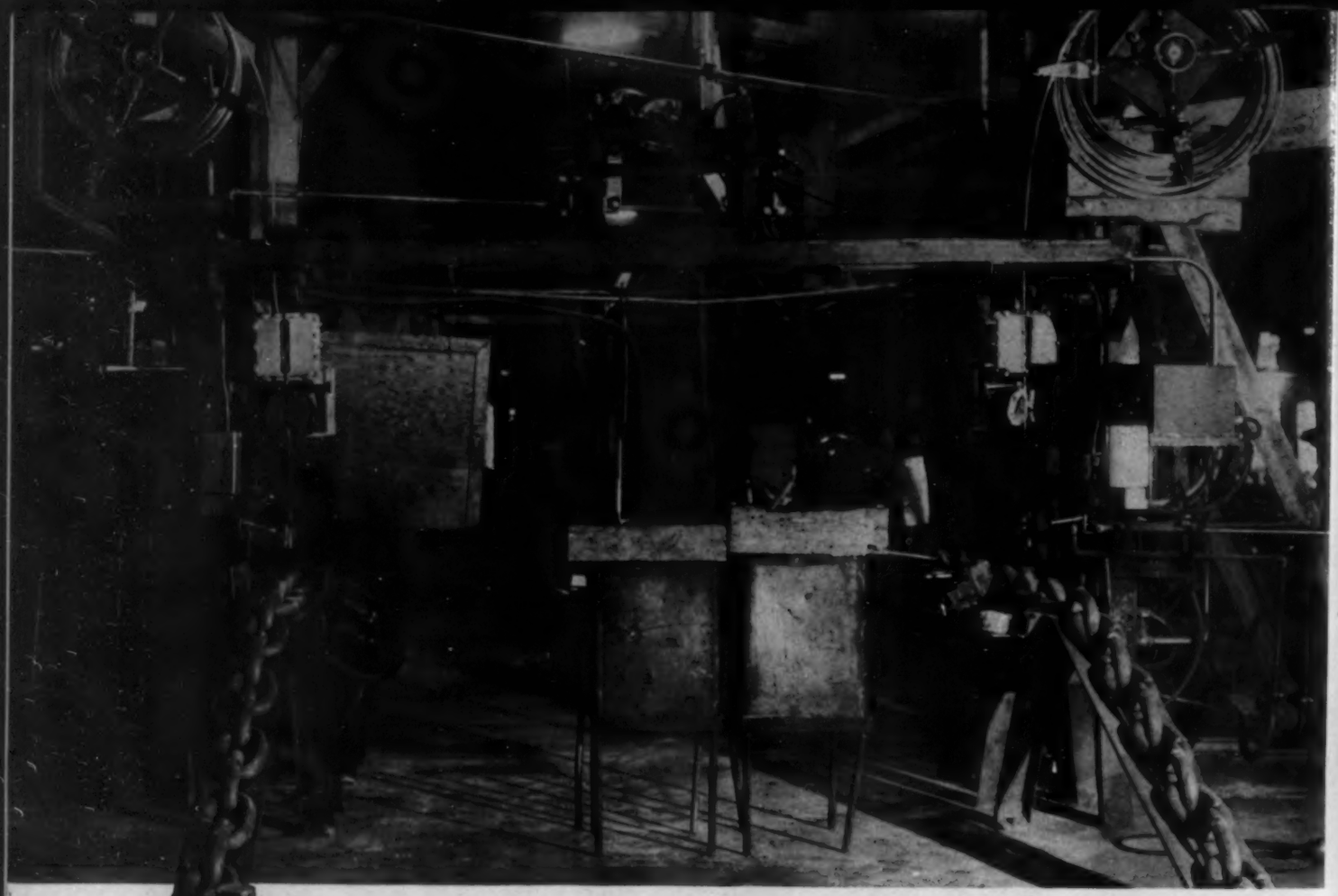
Throughout the foregoing discussion, there has been repeated references to the cups used. It is unfortunate that, as a matter of military necessity, all of the reasons why the cups of the form being used are required cannot be disclosed. Suffice it to say that without the form of cup being used, it is extremely doubtful that successful cartridge cases would ever be made. It is of interest to note that the first disclosure to the Ordnance Department of the type of cup currently being used, produced by cold working, was offered by the Bowen Products Corp., Ecorse, Mich. Since that original disclosure, needless to say many changes in detail have been made, but the same basic principle is in use.

Far-reaching Effect

It is not permitted to disclose the technical data, the use of which is necessary in order to produce satisfactory steel cases. When the time comes that it can be disclosed, the entire story will be made available to American industry and it is the feeling of all associated with the development that, apart from the great task of accomplishing the conversion to make available brass for other more sorely needed items, the development will make drastic changes in the manufacture of a multitude of items used in civilian life and may give rise to new products which were never before available because it was not known that steel of the type being used in cartridge cases could be so worked.

For example, during the term of this development, cartridge cases have been drawn from steels carrying as high as 45 points of carbon, 150 points of manganese and innumerable formulas involving the alloying materials. This in face of the belief that all held a year and one-half ago that deep drawing steels in the main contained a maximum of 15 points of carbon and little or no content of alloying elements.

The manufacture of ammunition is not spectacular. It carries none of the glamour of sleek and beautiful airplanes, of powerful rugged tanks or of complex weapons. But without ammunition, none of these other components would be of any use. The quantities required are huge. The normal materials for this production are scarce but quantities of this scarce material will be available for more vital needs by virtue of this conversion program.



ANCHOR

. . . . are now electric welded

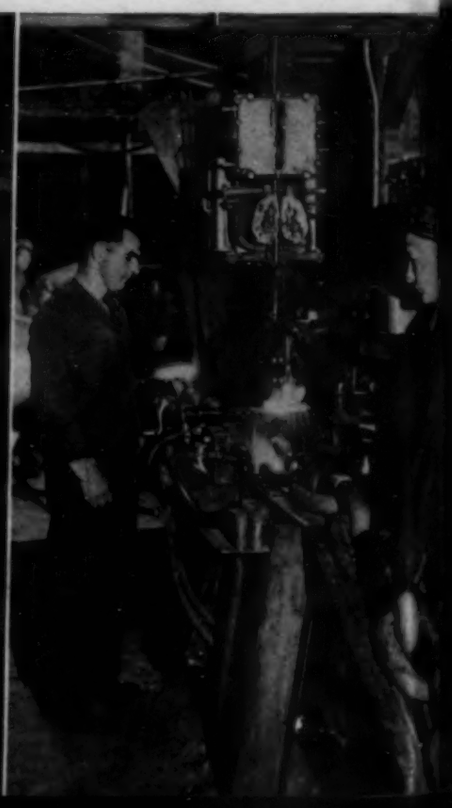


Fig. 1. (Left)—Welding machines are in pairs. Remote-controlled motor-operated switch on bridge permits the operators to "toss" the welding current from one machine to the other

Fig. 2. (Bottom left, opposite page)—After most of excess metal is removed with a cutting torch, the joint is finished by this operator with a swing grinder

Fig. 3. (Bottom right, opposite page)—Chain going into welding machine. The weld is made in a mold formed by the two clamping jaws that close about the joint. Only vertical links are welded at first pass

Fig. 4. (Directly below)—Weld has now been completed and jaws of the machine have opened to show the two halves of the mold

Fig. 5 (Right, below)—First step is cutting bar to length. Here bar is moved into cutting machine from right on roller. Stop at left positions bar under torch. Cut lengths fall on frame, roll to pile on floor. Operation is continuous and fast

By HENRY W. YOUNG

CHAINS

by Unionmelt method

UP TO RECENT times, chains for ships' anchors have been fire welded, using only wrought iron or low-carbon steel. High-tensile steel could not be used because it was impossible to make a fire weld with it that would be as strong as the bar itself. But the advantage of high-tensile steel for this purpose was so great as to make almost mandatory the development of some process by which it could be used.

As a result, not one but three processes have been developed. One of these is a highly specialized method of steel casting. The second method embodies the drop forging of each link in two pieces and then assembling them into a complete chain by mechanical joints. The last method, electrical welding, was developed less than two years ago by the Pacific Chain & Mfg. Co., Portland, Oreg., and is now being used to manufacture anchor chains for Victory ships built by Henry J. Kaiser and others on the Pacific coast.

To date, it is understood that the Pacific chain is the only electrically welded anchor chain made in large sizes on a production basis, although other methods are said to be in the offing. It would be inaccurate to say that electrical welding has never been applied to large chains made of high-tensile steel. It has been done by the resistance method of welding, notably the chains for the QUEEN MARY. But in that case the current demanded was so great that it was necessary to install a special power plant with a power output, it is said, sufficient for a fair-sized city. Therefore, the resistance method appears impractical in competition with other methods.

The Pacific method is an adaptation of the Unionmelt process to chain manufacture. It is, in fact, the only application of that process to the welding of round bar stock, it having been used heretofore almost exclusively for welding plate.

The whole process of anchor chain manufacture in this relatively small Portland plant is an interesting one. Working now largely on chains for Victory ships, they are turning out a heavy product, the links being made from stock 2⅛ inches in diameter. This is standard anchor chain in which the link (outside measurement) is six times as long as the diameter of the bar. These links are made up into chain in 15-fathom "shots" (90 feet to the land lubber), weighing 1¾ tons to the shot. As many shots as are needed are connected on shipboard by means of detachable links to form a continuous anchor chain of the desired length.

Round bar stock of high-tensile manganese steel, 2⅛ inches in diameter, is unloaded direct from railroad cars to a storage yard adjacent to the main plant. Here it is cut into 25-inch lengths by means of two Linde oxyacetylene cutting machines. These short lengths are moved into the plant at the head of the

Fig. 6—Patented forming machine shapes white-hot bar lengths into chain links. V-shaped opening is left in link for the welding operation

manufacturing lines. The first step in the process is to heat the bars to a uniform red heat suitable for bending. This heating is done in a large oil-fired furnace, in which they roll down an incline and are taken out on the opposite side.

Then the red-hot bars go to a special forming machine, designed and patented by the company. Two men operate the machine, which grasps the bar and brings the two ends up and over to form a link—not fully closed, however. As the ends come together in the machine, they nearly meet at the inner surface of the link. But they do not meet at the outer surface by about an inch, due to the greater outer circumference. Thus, a V-shaped opening is left in each link at the junction, which is utilized in the welding process.

Each bar, before it is clamped in the forming machine, is passed through the preceding link so that a continuous chain is formed, minus the welding up of the V-gap. From there, the chain passes through the other steps, being hauled along over the floor by means of small electric winches, using cable lines with hooks on the ends for seizing the chain. Where turns are to be negotiated, vertical steel spools are installed on the floor. There are two of the forming machines, and each has a capacity of 100 links per hour.

A shot of unwelded chain is drawn up by a winch in front of the welding machine, with a few coils of slack on the floor arranged by hand and then started up an inclined conveyor trough, where it is seized by a cable from a winch at the opposite side of the room and pulled up the conveyor and through the welding machine and the operations that immediately succeed it. These consist in burning off the excess metal left at the head of the mold, and in grinding the joint smooth with a swing grinder.

The welding machine operator starts the winch from his position by push-button control, and as he completes the welds and pulls the chain forward link by link the burner and grinder must keep up with him. His work and theirs is done on a level stretch of conveyor at about waist height, after which the conveyor trough drops to the floor again.

The welding head and control as well as the transformer on each welder are standard equipment. It is in the copper welding molds which are applied to each successive link by a patented clamping arrangement, operated by a compressed air cylinder, that the novel feature of the process lies. The two halves of the mold constitute the two jaws of the clamp, which, when closed, fits snugly around the bar of the link and encloses the V-shaped gap with provision made for the end of the stud. This stud is a steel bar set crosswise of the link midway, one end coming under the V-gap and being solidly welded to the link in the same operation. The top of the mold is open. The other end of the stud is formed to fit the surface of the opposite side of the link, but is not welded thereto. Main purpose of the stud is to prevent kinking of the chain when in use.

The routine of the welding machine operator is this: He pushes the winch button and draws the chain forward until the vertical link is centered in the jaws of the mold. He then brings the jaws together two or three times—a powerful trip hammer action under the air pressure, which serves to knock out any scale or residue that might be in the V-gap and also to line up the link. Next, he inserts the stud in an upright position between the two sides of the link at the proper point under the gap

The jaws of the mold are then brought together and held there, enclosing the gap. Into the opening in the top of the mold he then ladles the Unionmelt welding compound, enough to fill it and then some. Any excess falls on the floor, from which it is scooped up at intervals, screened and returned to the supply bin. This compound acts as a flux. The welding rod supplies the metal for the weld.

Finally, he presses a button and the welding current is turned on through the welding rod, which projects down into the gap through the compound. The welding operation then starts and continues until the weld is made, when the current is automatically cut off by the machine.

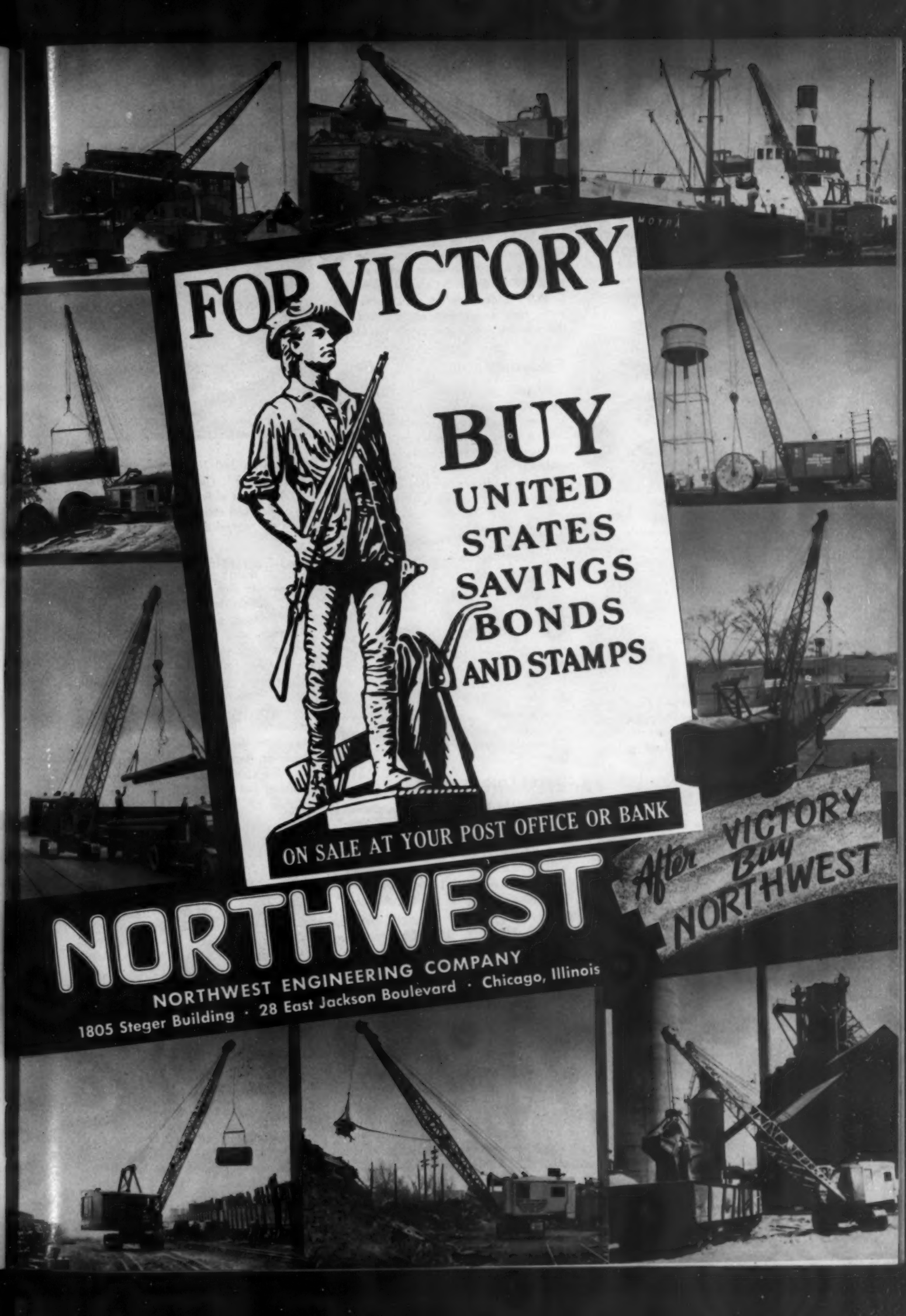
The operator then presses another remote control button actuating a motor-operated two-way switch. This throws the welding circuit from his machine over onto the adjoining one. It so happens that the operations preliminary to the weld, such as drawing up the chain, inserting the stud and putting in the compound, take just about the same length of time as that required to make the actual weld. Therefore, the four welding machines in the plant are installed and operated in pairs. While one operator of a pair is welding, the other is preparing for a weld. More than two of the four machines cannot operate simultaneously.

Without this arrangement, it can readily be seen that if the machines were operated individually, at times all four machines might be welding at once, instead of only two as now. This would necessitate an electric power supply system of just twice the capacity. Thus transformers, feeders, switchgear and power loads are reduced 50 per cent in size.

Each of the four welding machines is capable of welding 40 links per hour. That rate is closely approximated at all times during an 8-hour shift. Welding current is supplied by a bank of two 200-kilovolt-ampere service transformers, reducing the line voltage from 11,000 to 440 volts, rated, although in operation the voltage is approximately 480 volts. There are two welding transformers to each pair of machines, instead of two to each machine as would be necessary without operation in pairs.

Each welding machine requires 1250 amperes at 30 to 80 volts. This range of welding voltage is required to compensate for variations in rod speed. The rod used is a special type, furnished by Linde. It comes in 200-pound coils, which are mounted on reels above the

(*Please turn to Page* 96)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INDUSTRIAL EQUIPMENT

Inspection Gage

Trico Products Corp., Buffalo, is offering a new Braille type comparator inspection gage for use by blind workers. Endorsed by the National Society for the Blind, the development is known as the Micro-Chek. It is the outgrowth of the newly perfected Micro-Chek for regular workers in the United States.

The device visually checks dimensions

with split-thousandth accuracy. Since the instrument multiplies dimensions by as much as 200 and is equipped with a large, gaging indicator which moves between two fixed indicators showing the tolerance limits, the fixed indicators may be adjusted to any desired tolerance limits, copied from a master part.

In the Braille instrument, the indicators protrude through a slot, so that a finger touch reveals the movement and enables a blind inspector to determine instantly whether the part will or will not meet the tolerance requirements. The unit is furnished with various anvils for thread-gaging, thread-lead gaging, for internal dimensions, etc.

Women's Work Shoes

F. J. Stahmer Shoe Co., Davenport, Iowa, is offering a new work shoe featuring wooden soles designed for women

workers. It is said to offer both foot comfort and safety.

Basic design of the shoe is similar to the wooden sole shoe which was recently popular in high schools and colleges. Changes and new features include the addition of lacings and tongue which hold the upper close to the instep.

Soles are of close-grain maple cut with the proper rock for ease in walking and correct arch support. The 2-inch heel is covered with a composition lift to eliminate noise. Counters are inserted in a leather counter pocket which gives the inside of the shoe a smoother finish for added comfort. All seams are water tight and uppers are attached to the sole with wire and staple stitching.

Soldering Iron

Hexacon Electric Co., 161 Clay avenue, Roselle Park, N. J., now is offering a new soldering iron known as the hatchet type, chief advantage of which is that it gives better balance on certain soldering operations and decreases operator fatigue. It incorporates all features of the company's regular soldering irons,

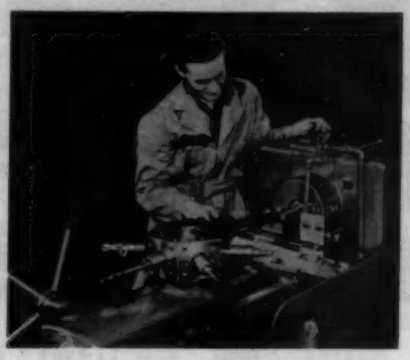
and meets requirements of all government specifications, including Navy, Air Corps and Signal Corps specifications.

Turret Lathe

Oster Mfg. Co., Cleveland, announces that its No. 601 rapiduction turret lathe previously furnished with manually controlled 6-station turret, is now equipped with automatic indexing. The machine, having a capacity of 1½ inches (round) for cutting-off, boring, tapping, reaming, facing, threading, and for other operations, is simplified in design and construction.

Where three or fewer operations in sequence are required, the machine is offered with a plain saddle instead of the 6-station turret. It can be had with a worm or direct drive to the spindle, a 2-speed motor, reverse, electric brake control.

The motor connects by means of multiple V-belts, with speed changes being obtained by application of quick-change sheaves for 140 to 1000 revolutions per minute on the worm-drive design with 1800/3600 revolutions per minute motor; and 70 to 500 revolutions per minute with 900/1800 revolutions per minute motor; and with 900 to 3000 revolutions per minute on the direct drive design with 1800/3600 revolutions per minute motor and 450 to 1500 revolutions per



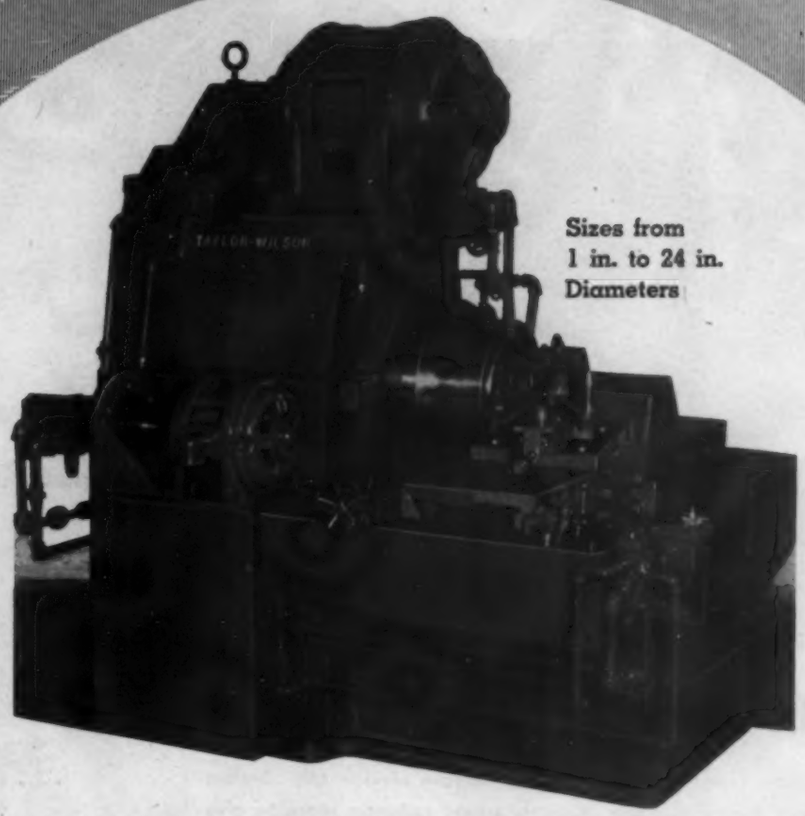
minute with 900/1800 revolutions per minute motor. The machine occupies 33 x 70 inches of floor space, not counting its bar-feed extension which requires 94 inches beyond the pan.

Dust-Collecting Benches

Wolverine Equipment Co., 31 Main street, Cambridge, Mass., announces dust-collecting benches, self-contained downdraft units for carrying away and filtering dust from snagging, polishing, grinding or any flexible shaft or hand-tool operation. Castings or parts placed on work surface of these dust-collecting benches are surrounded by a smooth and positive downflow of air carrying dust away from the operator. Large pieces of the very heaviest particles are collected in the upper tray, heavy particles in the base, and fine and dangerous dusts

in the heavy-duty viscuous filters. Average cleaning cycle for filters is once a week. Pan and base need cleaning a few times a year. The whole unit is

One Man Operates this Cutting-Off Machine



Sizes from
1 in. to 24 in.
Diameters

**For Cutting-Off Bomb Blanks
Roller Bearing Blanks, Etc.**

Every man hour saved in war production speeds the day of victory.

The Taylor-Wilson Cutting-Off Machine saves man hours in the cutting off of Bomb Blanks, only one man being required to operate it.

The machine may be operated at sustained high speed and is capable of production far beyond what might be termed normal maximum.

Made in six sizes, each with a wide range making unnecessary the installation of a number of machines —thus conserving floor space.

Used extensively also in the cutting of Roller Bearing Blanks, Coupling Stock, etc.

Will cut tubing made of all grades of steel including N-80 seamless.

Write for descriptive folder.

TAYLOR-WILSON MFG CO.
15 Thomson Ave., McKees Rocks, Pa.
PITTSBURGH DISTRICT

CLOSE CYLINDER VALVE WHEN SHUTTING DOWN

Your regulators are built to give long, dependable service but careless treatment shortens their useful life. It's only sound common sense to give mechanical apparatus the best of care, and today it is essential because replacements are scarce.

For example, always close the cylinder valve when shutting down for long periods. Even if it's only for four or five hours, this precaution removes needless strain on the regulator seat. Repeated several times a week, these sensible "rest periods" add up to a valuable extension in regulator service.

Closing the regulator adjusting screw while setting up a new job is another way to prevent unnecessary wear on your apparatus. This step only takes a minute and eliminates useless pressure on hose and torch valves.

Make yourself a Waste Warden! Stay on guard against careless wear and wasteful practices. Take good care of your apparatus — keep every cubic foot of oxygen and acetylene working for America's smashing victory ahead!

THE WASTE WARDEN *says:*

DO close cylinder valve after use.
DO check your hose and connections for leaks.
DO keep your cylinder inventory low and return empties promptly.
DO keep tips clean and free from carbon and slag.

★ ★ ★

DON'T use excessive pressure.
DON'T use oversize tip.
DON'T leave torch burning when not in use.
DON'T abuse cylinders.

Air Reduction

General Offices:
60 EAST 42nd STREET, NEW YORK, N. Y.
IN TEXAS
MAGNOLIA-AIRCO GAS PRODUCTS CO.

AIRCO

WILSON

IDLE CYLINDERS ARE PRODUCTION SLACKERS: *Keep 'em rolling for victory!*

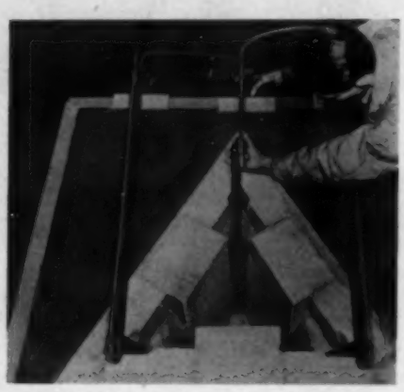
completely accessible for cleaning.

Not only is the air cleaned by these units, but, according to the company, it also is returned to the room, thereby wasting no heat. Units can be installed wherever they are needed in the production line. They do not require any piping connections.

While the unit was developed especially to remove dust from snagging and finishing departments of machine tool manufacturers, these downdraft benches are beneficial wherever flexible shaft or hand tools are in use grinding, polishing, or cutting. Benches are furnished with wooden gratings where softer metals are being worked. They are constructed of heavy structural steel shapes with heavy gage iron sheets for the pans and back baffle and electroforged steel grating for the working surface. Suction is produced by a high pressure axial flow fan. Fan motor is ¼-horsepower, 1750 revolutions per minute, totally enclosed construction with sealed ball bearings.

Salt-Bath Furnace

Upton Electric Furnace Division, 7450 Melville avenue, Detroit, is offering a new type electric salt-bath furnace. It uses three electrodes which are reported



to provide better heat distribution and uniformity.

Of triangular shape and with an electrode in each of the three corners, the pot of the furnace is bricked so each electrode is placed in a deep recess in the bricking, eliminating possibility of contact with work. Two steel pots, one inside the other, and both insulated from each other and from the outside shell of the furnace, reduce heat losses.

Unusual height of bricking above the surface of the salt cuts radiation, and serves as a shield for the operator. Electrodes are fastened to the water-cooled bus bars by a bolt connection. Water-cooling the bus bars increases the efficiency of the electrical connection and also permits handling of bus bars themselves with bare hands, even while the furnace is in operation, it is said.

Drum Plug Wrench

Industrial Products Co., 2820 North Fourth street, Philadelphia, announces a new drum plug wrench for use in removing and tightening plugs or bungs in

steel drums. It can be used in departments where all classes of drums are handled. The wrench is of alloy steel with long iron pipe handle, also in S monel metal which has low sparking qualities.

Steel Type Holder

Jas. H. Matthews & Co., 3942 Forbes street, Pittsburgh, announces a new Champion interchangeable steel type holder that can be converted quickly and easily for use in a press for production stamping on all types of products, or for use with a hammer depending on the marking application.

For hand-stamping applications, the removable head is placed over the shank and held in place by means of a set screw, tightened at the side. For press use, the head is removed and the shank is placed into press equipment. The holder is suitable for 90 per cent of all heavy or medium marking applications. It can be made for any desired type capacity.

For light-duty marking, which includes the marking of wood, brass, and other soft materials, up to ½-inch character is recommended. For medium-duty marking, which includes marking of cold-rolled steel, and carbon steel, etc.

up to ⅜-inch character size is used. For medium heavy-duty which includes deep marking of carbon steel or marking high-alloy tool steel, up to 3/16-inch size characters are recommended. Type is changed in the holder by applying slight pressure on a spiral spring, which disengages the spring clip from the type groove.

Hydraulic Press

Hydraulic Press Mfg. Co., Mount Gilead, O., announces a self-contained deep drawing press for sheet metal. It is equipped with blankholder and die cushion for drawing large, deep metal airplane parts.

A matched punch and die set is employed with this press. A ring, carried by the blankholder slide, holds the blank while the part is drawn. Usually the part is completely drawn from a flat blank to the required shape in a single press stroke. The press also will accommodate all standard types of deep drawing dies, or if required can be employed

for single-action press work such as coining, sizing, straightening, etc.

Blankholder slide of the press is in tandem with main slide and suspended from it. The two slides advance together at identical speed until blank is contacted. The extension guides (cast integral with the blankholder slide) serve two purposes: Through adjustable gibs, they securely guide the blankholder slide on the four inner corners of the press upright, and as the inner corners of the blankholder slide extensions are beveled they serve as guide ways for the main (punch carrying) slide.

The press bed is hollow and fitted with a hydraulic die cushion. Latter also can be used as an ejector. Blankholder pressure is variable at six points on the periphery of the blankholder ring. The pressure resistance of each of the six blankholder rams can be adjusted individually and independently. Another

feature of the press is only one hydraulic pump is required. Oil trapped in the blankholder and die cushion cylinders is intensified by downward acting movement of the upper punch carrying slide. These pressures produce the resistance forces necessary for holding the blank and cushioning the draw. The press employs a closed circuit operating system. Means also are provided to operate the press in any one of three different ways; manual, semiautomatic or full automatic.

Adjustable Hole Cutter

Robert H. Clark Co., 3424 Sunset boulevard, Los Angeles, is offering a new 3-blade adjustable hole cutter for use

in electric drills, pneumatic motors, drill presses, lathes, milling machines — wherever Morse taper or straight shank tools can be used. It will cut clean holes ¾-inch to 4½ inches in diameter in metals, plastics, hard fibers, pressboard or wood in thin sheets or ¾-inch thick plates.

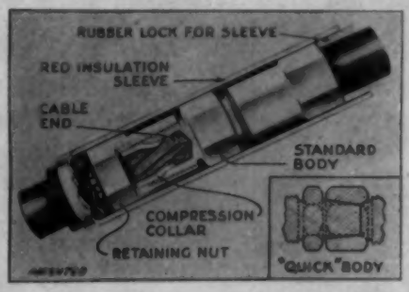
Feature of the cutter is that no finish grinding or filing is required when the cutter finishes its job. Its cutting action is fast, producing long curled shavings.

Connectors and Lugs

National Cylinder Gas Co., 207 West Wacker drive, Chicago, announces new solderless connectors and lugs for welding cables. These feature advantages such as speedy field installation, complete safety, full protection of cables, and conservation of vital materials.

The body of standard Cable-Tite connectors is one piece. The "quick" models, recommended for use where the whip-end and main cables connect, have a 2-piece body as shown in the line drawing. A slight twist while connecting locks the body into one unit.

No soldering is necessary in installing



these units. A compression collar grips the cable-end and shapes it into a head which cannot work out of the fitting. After initial installation, cable lengths may be connected or disconnected by hand. A heavy-duty insulation sleeve, held by soft rubber locks, assures safe operation and entirely eliminates taping.

Welding Machine

Hampton Electric Mfg. Co., 312 Archie street, Oakmont, Pa., is offering a new model G alternating-current welder for general welding in manufacturing plants, machine shops, etc. Operating on a supply voltage of either 220 or 440 volts, it has a welding capacity of 30 to 300 amperes, and can be operated continuously at 225 amperes.

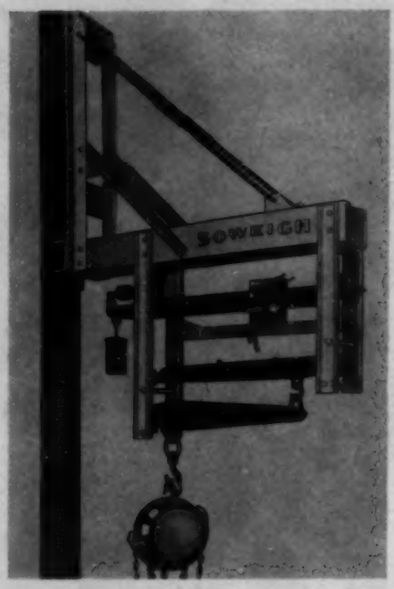
Welding current can be controlled for an infinite number of welding heats, between minimum and maximum by means

of a crank at the top of the machine. Equipped with a thermostatically controlled, mercury arcless, automatic cut-out switch, the unit is protected against excessive overloads for long intervals. Windings are of square wire, of ample size to permit considerable overloads.

The unit also has a stabilizer in the welding circuit, which controls and balances the voltage and current across the arc, decreasing spatter and assuring a homogeneous weld. Any alternating-current electrode from 1/16 to ¼-inch inclusive, can be used for either horizontal, vertical, or overhead welding. The machine is 16½ x 23½ x 28 inches high, weighs 325 pounds and is mounted on four large ball-bearing casters.

Radial Weighing Scale

Soweigh Scale Co., Delavan, Ill., is offering a new adaptation of weighing equipment in the form of a radial weighing scale. It is a shop and factory scale to yield net weights without tare and is



for service over a definite floor area without permanent reservation of any floor space.

The scale is being offered from stock designs enabling the load hook to swing over a radius of 8 feet or less. Increased radius up to much greater dimensions can be offered upon special consideration of headroom available. Operation on a monorail track is a stock design.

The illustration shows this scale with radius restricted to 2 feet. Usual support is a building column. Units in capacities of 4000 and 6000 pounds are available immediately. A choice of weighbeam equipment also is offered to allow normal rapid hand weighing or else stamping of weights on tickets.

In operation, load is placed upon load hook by a chain hoist, or manual tackle may be devised for the purpose. In any case the hoist or tackle can be balanced off as part of the dead load of the lever system, and thus the result read is net weight. Safety features are incorporated to prevent parts falling from the scale.

Speed WAR PRODUCTION TRAINING

USE THESE BOOKS AND FILMS ON LATHE OPERATION

One of the most serious problems confronting management today is the training of new employees to replace thousands of skilled technicians who have been called for service with the armed forces. With inexperienced workers, production goals must be increased and standards of precision and quality must be maintained. To accomplish this, a vast army of men and women must acquire new skills in the shortest possible time.

To help you train new lathe operators, we offer the practical aids listed below. These books and films on lathe operation have proved effective in hundreds of apprentice training schools, including Army and Navy training stations.

Write for Information on These Practical Training Helps

MOTION PICTURES—"The Lathe" and "Plain Turning"—two new 16 mm sound films in color on lathe operation. Available on a free loan basis for apprentice training. Showing time 20 minutes each. Write for circular.

HOW TO GET THE MOST OUT OF YOUR LATHE—Specialized service bulletins on the care and operation of engine lathes. H-1, "Keep Your Lathe Clean"; H-2, "Oiling the Lathe"; H-3, "Installing and Leveling the Lathe." Sample copies mailed on request.

HOW TO RUN A LATHE—A practical 128 page operator's handbook. 360 illustrations. Written in simple, non-technical style easy for the beginner to understand. Used as a shop text book by the Army, Navy and Air Corps. Price 25c. Sample copy free to apprentice supervisors.

WALL CHARTS—40 different wall charts and blueprints of drill sizes, pitch diameters of screws, standard fit tolerances, correct use of calipers, etc. Ask for Circular BPL listing and describing these charts.

THREAD CUTTING—21 page book, "How to Cut Screw Threads in the Lathe." Shows how to set up a lathe for cutting various pitches of screw threads; setting cutter bits; screw thread formulae; metric threads, etc. Price 10c. Sample copy free to apprentice supervisors.

GRINDING CUTTER BITS—12 page book on grinding lathe tool cutter bits. Covers identification and application of various bits, methods of grinding, correct angles, etc. Price 10c. Sample copy free to apprentice supervisors.

ARMY E NAVY

SOUTH BEND LATHE WORKS

LATHE BUILDERS FOR 36 YEARS — SOUTH BEND, INDIANA

ROEBLING Wires
ROUND . . . FLAT . . . SHAPED
A FEW WIRES TYPICAL OF ROEBLING'S BROAD SPECIALTY PRODUCTION
FOR IMMEDIATE ACTION
ON THE PRODUCTION FRONT
ROUND WIRE TO SPECIFICATIONS
SHAPED WIRES
FLAT WIRE FOR BAND SAW BLADES

Want to speed machine output, minimize reject losses or concentrate more of your facilities on final assembly? Then start with Roebling wire that meets your toughest specs with plenty to spare . . . that needs no further treatment to go to work in your Victory products.

Roebling Flat Wire for Band Saw Blades is a good example. Every inch of this highly flexible steel must start out with plenty of toughness, so it's made from carefully selected melts in the Roebling mill. Quality must be held within very strict limits for uniform tooth cutting and hardening. So it's made and rolled to exacting specifications of tensile strength, temper, dimensions and finish.

This is the kind of flat, shaped or round wire job that Roebling takes in stride . . . because we have the experience and custom-production tools and war-won training to handle it. You, too, can save metal and machine-time when you call in Roebling to meet your tough wire "specs". Prompt action on war orders.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY · Branches and Warehouses in Principal Cities

Kaiser's Plant

(*Concluded from Page 78*)

with Ward Leonard type of control.

Power for use throughout the plant is to be furnished by the Southern California Edison Co. with alternating current at 69,000 volts, 3-phase 50 cycles.

Due to the shortage of critical materials, every effort was made in the design of the plant to substitute reinforced concrete construction instead of steel.

The plant is located near a fault zone and, therefore, elaborate provisions had to be made in order to make all of the buildings earthquake proof. The tall stacks above the foundation were designed with a 25 per cent seismic coefficient. The remainder of the buildings were designed in accordance with the applicable building regulations of the state, with a seismic coefficient of plus 10 per cent.

The scarcity of water made it necessary to reduce the amount of water required to a minimum. As a result, all water will be recirculated and losses reduced to those due to evaporation.

The responsibility of the design of the iron and steel plant rested in the engineering department of Kaiser Company, Inc., Iron and Steel Division, and the following consulting engineering firms were employed in the design of the various parts of the plant:

Blast furnace, William M. Bailey Co., Pittsburgh; plate mill, C. H. Hunt, Pittsburgh; open-hearth plant, Open Hearth Construction Co., Chicago; power plant, Bechtel-McCone-Parsons Corp., Los Angeles; coke plant, Koppers Co., Pittsburgh; raw material handling, A. J. Boynton & Co., Chicago; structural and foundation work, Donald R. Warren, Los Angeles.

Clark & Clark, Palo Alto, Calif., is the consulting architect.

Booklet Gives Data on Vitamins in Industry

Results of recent studies on the use of vitamins in industry are included in a new booklet recently issued by Cincinnati Vitamin Co., Cincinnati. It embodies surveys by eminent authorities which reveal graphically extent to which vitamin deficiency in workers are responsible for employe absence and below-peak production.

Among topics treated in this 12-page booklet are: The effectiveness of multiple vitamins in industry; methods of vitamin distribution; costs and employe acceptance. Copies of the booklet may be obtained by writing to the company.

ROLL PASS DESIGN

By W. Trinks

★ **VOLUME I**—Third Edition (just off the press)—This book outlines the underlying principles of roll pass design. Both elementary and advanced instructions and theories are fully covered. General laws and rules of roll design applicable to the rolling of any section are presented. This book goes into considerable detail concerning the classification and strength of rolls, and the principles governing the entrance and deformation of bars. Profusely illustrated, this book is a practical manual of roll pass design . . . "Roll Pass Design", Vol. I; 201 pages, 7 tables, 139 drawings, bound in red cloth over heavy bookboard covers, $5.00 postpaid. (3% additional for orders delivered in Ohio.)

★ **VOLUME II**—Second Edition—This volume covers the underlying theoretical and practical reason for the shape and size of roll passes. Different methods of rolling a given section are compared, thus making the volume a treatise illustrating the application of principles rather than a catalog of roll passes. Coupled with Vol. I, this book provides the engineer with full and complete information, both theoretical and practical, through which he can secure factual data in relation to all factors of the subject . . . "Roll Pass Design", Vol. II; 246 pages, 21 tables, 7 charts, 176 illustrations, bound in red cloth over heavy bookboard covers, $6.00 postpaid (3% additional for orders delivered in Ohio.)

★ **SUPPLEMENT**—New material, available since publication of volumes I and II, is included in this supplement. Reference is made to pages in the two volumes. Alone the supplement will be of little value, and its sale is recommended only in conjunction with either or both the original volumes. Price $1.50 postpaid. (3% additional for orders delivered in Ohio.)

ORDER YOUR COPIES TODAY

THE PENTON PUBLISHING CO.

Book Department

PENTON BUILDING CLEVELAND, OHIO

EVERY single day almost four million Elastic Stop Nuts go into war production.

Even at that, and with all our expanded plant, it doesn't fill the demand.

It happens that the most urgent need right now is on aircraft. Every American plane that takes the air has some important part of its structure fastened with these strong, tight-holding nuts. Some types take as many as 35,000 in a single ship.

The reason is: *these nuts stay put under the toughest circumstances.*

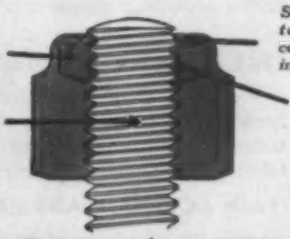
You handle them exactly like regular nuts. They go on fast, lock immediately and automatically.

There's no need of pins, washers or auxiliary locking devices.

Once on, they stay there—never shake loose. But you can take them off and put them back on many times and they won't lose their locking ability.

This is why there are more Elastic Stop Nuts on America's planes than all other lock nuts combined. And why they are also used in important structural applications on guns, naval vessels and other war equipment.

We have made billions of Elastic Stop Nuts and, as far as we know, not one has ever loosened.


Tough, elastic locking element.
Fits standard bolt.
Seals threads at top — prevents corrosion of working threads.
Locking collar cannot harm the bolt threads.

• Write for folder explaining the Elastic Stop self-locking principle.

ELASTIC STOP

SELF-LOCKING NUTS AND AIRCRAFT FITTINGS

ELASTIC STOP NUT CORPORATION

2330 Vauxhall Road, Union, N. J.

Anchor Chains

(*Concluded from Page 86*)

welding machines, feeding automatically down through the welding heads.

After passing the welding machine, the chain proceeds along the conveyor to the burner's station where the excess metal on the head of the weld is burned off approximately flush with the surface with an oxyacetylene torch. The finishing process is then completed by grinding at the next station.

It may be said at this point that the first machine welds only the links that are vertical as they pass through the conveyor. The same chain is afterward run through the first machine of the second pair while positioned so that the unwelded links pass through vertically and are welded. This saves any twisting or turning of the chain, as would be the case if it were welded link by link at one pass through a machine.

It sometimes happens that the weld does not completely fill the gap and there is a slight depression. In such cases an operator with portable electric welder farther along the line fills up the slight depression and the surface is smoothed with a portable grinder. After finishing, the shot of chain is placed on a flat car and goes into an annealing oven where the welding stresses are removed.

Each shot of chain is then proof tested to a total of 243,930 pounds by means of a standard Riehle testing machine working in conjunction with a 90-foot test pit. After this, a 3-link specimen is taken from each shot and subjected to a break stress. It must successfully pass a stress of 341,510 pounds on this test. Should it fail, a second 3-link sample is selected and tested. If that survives, the shot is passed as a whole. Very seldom is it necessary to make a second test, and in no case to date has the chain failed to pass on a second test.

Finally, the chain is drawn out on a waist-high inspection table under powerful fluorescent light, where it is minutely inspected by an American Bureau of Shipping representative who looks for any imperfections in either weld or bar stock. He also is the one who makes the selection of samples and supervises the break tests. After passing tests and inspection, the end links of both ends of each shot are marked with a steel stamp, showing date and certificate number.

Nothing remains now but to load the shots on gondola or flat cars, or trucks, as the case requires, and hurry them out to the shipyards, where they become a vital part of the victory program.

This description, made possible through the courtesy of R. S. Miller, president of the Pacific Chain & Mfg. Co., has applied specifically to the manufacture of Victory ship anchor chains, made out of 2⅞-inch stock. Mr. Miller states, however, that in the year and a half that the plant has been in production anchor chains have been welded up to the heaviest in use by the simple expedient of changing molds. Furthermore, smaller chains, down to stock ¾-inch in diameter, have been economically welded by the process.

Quick Use of Studs Stops Big Leak

When a big leak developed recently in a 15-inch cast-iron main carrying low-pressure steam to heat five buildings at General Electric's Schenectady Works, a quick, temporary repair maintained the supply until the pipe could be replaced.

In the method, devised by J. E. Schoenborn, general foreman of the steam fitting crew, four ⅞-inch studs were used to exert enough pull on the pipe's expansion joints to close the leak, a saw-toothed crack open ½ inch. The studs were run through the end flanges of the 12-foot section in which the crack was located and the pipe was pulled together by tightening the studs. A few light blows with a hammer around the crack seated the broken ends so that leakage was negligible.

. . . with the **BUDA** "Chore Boy"

(Half-ton Industrial Shop Truck)

SAVES TIME . . . CUTS COSTS

No batteries to charge . . . Chore Boy's rugged 7.7 hp. aircooled engine *stays* on the job hour after hour, night and day. Economical, too—maintenance and operating costs are extremely low.

INCREASES PRODUCTION

—Chore Boy's simple, safe controls and easy handling bring expert results from unskilled operators. Real riding comfort—women are operating Chore Boys all day long without fatigue.

FAST ACTION MEANS EARLIER DELIVERIES . . .

Write or wire for your copy of the BUDA Chore Boy bulletin NOW!

THE BUDA COMPANY
HARVEY (CHICAGO SUBURB) ILLINOIS

Helpful Literature

1. Corrosion Preventives

United States Stoneware Co.—16-page illustrated bulletin No. 1620 is devoted to "Tygon" synthetic materials which are available in many forms for prevention of corrosion. Applications of these materials include tank linings, electrical controls, rolls, diaphragms, piping, sheet metal housings and tanks. This material is also available for electrical insulation and in form of tubing and coatings.

2. Electric Furnaces

Harold E. Trent Co.—4-page illustrated leaflet No. 42-TA is descriptive of line of electrical furnaces for heat treating applications. Representative types of furnaces, kettles, ovens, laboratory equipment, heating elements and allied devices are shown. Complete information is given on vertical recirculation furnaces of oil or salt type for annealing, drawing and hardening operations.

3. Belt Surfacing

Porter-Cable Machine Co.—20-page illustrated manual, "Wet-Dry Belt Surfacing," deals with method for production of metal or plastic parts of small size. Time savings advantages of belt surfacing operations are explained. Typical jobs and set ups for toolrooms, pattern shops, experimental departments and maintenance operations are described.

4. Electrical Controls

Square D Co.—Illustrated catalog carries detailed descriptive and engineering information on circuit breakers, switches, relays, contactors, push buttons, limit switches and special purpose devices for control applications in aircraft, tanks, boats, trucks and all types of portable or mobile equipment. Included are descriptions of lightweight devices which are primarily designed for aircraft and tank use.

5. Grinding Wheels

Sterling Grinding Wheel division, Cleveland Quarries Co.—6-page illustrated folder entitled, "Portable Grinding with Sterling Grinding Wheels," gives typical specifications and wheel marking analyses for various types of this company's grinding wheels. Suggested uses are given for all types and their characteristics are covered.

6. Cleaning Materials

Oakite Products, Inc.—8-page "Wartime Maintenance Digest," describes how cleaning materials, descaling methods and related techniques are helping metalworking plants in handling 41 equipment maintenance, plant housekeeping and sanitation jobs. Prepared in data sheet form, this guide outlines material used, method followed, time saved and advantages gained in each cleaning operation.

7. Pumps

Chain Belt Co.—10-page illustrated folder No. 428 gives pertinent facts about "Rex Speed Prime" pumps for oil field service. These units range in size from 8-inch model which delivers 125,000 gallons per hour to 1½-inch size delivering 3000 gallons per hour. Pumps may be used for moving water, oil and similar liquids.

8. Welding

Westinghouse Electric & Manufacturing Co.—12-page illustrated booklet No. B-3136 describes complete line of Flexarc alternating current welders, with current ratings from 100 to 500 amperes. Featured are 500-ampere industrial welder for high-speed, continuous welding on all types of heavy construction; and 300-ampere portable welder for heavy-duty work. Both models have built-in power-factor correction.

9. Roller Bearings

S K F Industries, Inc.—92-page illustrated reference catalog, "Steel Mill Data for Calculation and Design," contains formulas, designs, data tabulations and other information on steel mill applications of spherical roller bearings. Bearing applications for auxiliary equipment, cranes and drives, as well as roll neck bearing design, maintenance and lubrication are covered.

10. Wheels and Rollers

American Manganese Steel division, American Brake Shoe & Foundry Co.—24-page illustrated bulletin No. 842-WS gives complete information on car, conveyor, crane, gear, sheave, sprocket and miscellaneous wheels and rollers of manganese steel. Various types of products are shown and typical applications listed.

11. Drills & Reamers

Black Drill Co.—24-page illustrated bulletin, "Hardsteel Drills", gives full information on this line of drills, reamers, tool bits and special tools which will cut hardened steel without annealing. Instructions are given on use of tools, as well as typical applications. Standard sizes range up to 1 inch. Other sizes are made to order.

12. Motor Care

Crocker-Wheeler Electric Manufacturing Co.—12-page instruction book No. 501 deals with installation, care and operation of induction motors. Factual information is given which will lead to proper motor care and thus assure maximum service from motors.

13. Time Controls

Automatic Temperature Control Co.—8-page illustrated bulletin No. B-10 describes series 2800 timers for accurately controlling industrial operations on timed stop-cycle basis. Construction, design features, timing arrangements, operation and auxiliary equipment are discussed.

14. Bending Iron Plates

A. M. Byers Co.—16-page illustrated service bulletin, "The Bending of Wrought Iron Plates," presents procedures and engineering data on this subject. Methods and equipment used in cold, hot and compound bending are discussed. Included are glossary of terms, and instructions for specifying and ordering wrought iron plates.

15. Dust Control System

American Air Filter Co.—32-page illustrated bulletin is titled, "AAF in Industry." It covers subjects of industrial dust problems, atmospheric dust, process dusts and filtered air for industrial ventilation and air conditioning, for drying operations, in product finishing, and for control of bacteria and mold spores.

16. Wood Rolling Doors

Kinnear Manufacturing Co.—4-page illustrated bulletin No. 37, outlines features of rolling doors which have wooden parts to replace critical materials. These doors are available in widths from 8 to 20 feet and heights from 7 to 22 feet. They may be operated with manual or motor drive.

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17. Carbide Tool Grinding

Norton Co. — 64-page illustrated handbook, "Grinding Carbide Tipped Tools," gives full information on reconditioning and sharpening cemented carbide tools and cutters rapidly and economically. Use of metal bonded diamond and resinoid bonded diamond and "Crystolon" wheels are covered. General information includes grinding hints, summary of recommendations and other data.

18. Car Couplings

Phillips Mine & Mill Supply Co.—4-page illustrated bulletin is descriptive of mine and industrial car coupling pins and coupling links. Shown are five types of pins and links which are made of tough grade of steel and are drop forged. All pins are heat treated for extra strength.

19. Turret Lathes

International Machine Tool Corp., Foster division — 16-page illustrated catalog, "Foster No. 5 Universal Ram Type Turret Lathes," is descriptive of this line of machine tools. Details are given on bed and headstock, spindle control and drive, headstock transmission, universal carriage, hexagon turret, lubrication and machine attachments. Complete specifications are included.

20. Conveyors

Lamson Corp.—16-page illustrated bulletin, "Roller Gravity Conveyors," contains facts about roller gravity conveyors as well as accessories, supports, switches and stops. Included is table on selecting conveyors for various package sizes. Typical applications are shown.

21. Tool Lubrication

Sinclair Refining Co.—4-page illustrated bulletin, "The Service Factor," contains charted lubrication data for portable electric and pneumatic tools. In addition to showing various types of equipment within this classification, recorded lubrication is tabulated for specific tools made by established concerns.

22. V-Belt Drives

Multiple V-Belt Drive Association—16-page illustrated bulletin, "23 Ways to Conserve the Life of Your Multiple V-Belt Drives," contains check list of suggestions leading to conservation of V-belts. Exact steps to eliminate causes which lead to reduced belt life are shown with simple sketches. Recommendations are given on how to prevent avoidable delays and shutdowns.

23. Fire Extinguisher

Pyrene Manufacturing Co.—6-page illustrated folder, "Directions for Inspecting, Recharging and Maintaining Portable Fire Extinguishers," outlines procedures for proper maintenance of soda, acid, foam, cartridge and pump type fire extinguishers. Instructions are given for recharging assemblies and servicing these various types of portable extinguishers.

24. Lathe Operation

South Bend Lathe Works—4-page illustrated circular No. 21-C contains brief description of motion picture films, instruction books, bulletins, wall charts and blue prints which are available on lathe operation. This material is designed to aid in training apprentices in war production industries on lathe operation. Full details are given on how to secure these training materials.

25. Production Facilities

Spriesch Tool & Mfg. Co. Inc.—36-page illustrated catalog, "Ingenuity," outlines engineering and production facilities of this firm for making experimental pieces, mass production parts or assemblies of all types. Typical parts and assemblies which have been produced for armament service are shown. Manufacturing facilities are pictured.

26. Industrial Furnaces

Surface Combustion—32-page illustrated booklet entitled "The Great American Emergency," portrays essential differences between modern heat treating equipment and the application of these furnaces to future peace time needs. Typical heat treating operations for various types of war materials are described and potential peace time uses of these same methods are also covered.

27. Sound Systems

Stromberg-Carlson Telephone Mfg. Co.—16-page illustrated bulletin, "Tell It To Sweeney," covers use of sound systems for expediting manufacturing operations in industry. Details of system, typical layouts and other data are shown.

28. Metal Working Dies

Strippit Corp. — 8-page illustrated Bulletin A is devoted to details of individual self-contained sub-press type notching, punching and stripping die units. Typical applications of these devices as well as operating details are shown. Included are several pamphlets giving specifications and mounting instructions for various types of dies.

29. Speed Reducers

Winfield H. Smith, Inc.—2 illustrated bulletins, "Torque versus Horsepower," and "Overhung Load on Speed Reducer Shafts," cover important features which will aid in the solving of speed reducer problems. These service bulletins are designed to aid users of speed reducing equipment in securing maximum performance.

30. Industrial Trucks

Mercury Manufacturing Co.—20-page illustrated Bulletin No. 230 shows new models of industrial trucks, tractors and trailers approved under W.P.B. Limitation Order L-112. Included are explanation of procedure for ordering a truck under order L-112, detailed description and specifications on various models, and explanation of application for each type of equipment.

31. Chip Breakers

McKenna Metals Co.—4-page illustrated Bulletin No. 442 gives details of correct types of chip breakers for carbide tools and how to achieve them for various jobs. Diagrams supplementary to descriptive material are also included.

32. Turbine Pumps

Layne & Bowler, Inc.—32-page illustrated bulletin No. 4-42 presents complete data regarding vertical turbine pumps in capacities ranging from 50 to 16,000 gallons per minute for well casings from 4 to 36-inches in diameter. These pumps are designed for supplying water to all types of industrial plants. Large sectional views show construction of both water and oil lubricated types.

33. Centrifugal Compressors

B. F. Sturtevant Co.—20-page illustrated catalog No. 386-2 covers design 9 centrifugal compressors which will deliver comparatively wide range of air volumes at almost constant pressure. These compact units are available for all types of drives. Complete specifications for various sizes of units are given.

34. Barrel Pump

Trabon Engineering Corp.—4-page illustrated engineering bulletin No. 425 describes electric-hydraulic pump for pumping oil, light medium or heavy greases directly from original container. Pump operates from any electric outlet, and discharges constant volume regardless of pressure head. Six capacity and pressure combinations are available to meet various service requirements.

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What YOU Can Do About Scrap

EXECUTIVE:

Appoint a scrap director, armed with authority to act. Promote the use of posters, pay-envelope stuffers, and collection goals to enlist employees in the scrap campaign.

Make each foreman responsible for preventing waste in his department.

Enforce monthly rechecks in every department to find scrap material previously overlooked.

Report regularly on your plant's collection of scrap to the Industrial Salvage Committee set up by WPB in your community.

•

SUPERINTENDENT, FOREMAN, OR TECHNICIAN:

Survey all plant equipment, particularly idle, broken, or obsolete machines, and determine what might be salvaged, and what should be scrapped. Remember, any machine is more valuable repaired than scrapped.

Classify all scrap metal by its alloy content.

Provide separate containers, clearly marked for each class of scrap material.

Speed the return of scrap to steel mills through existing channels.

•

WORKMAN:

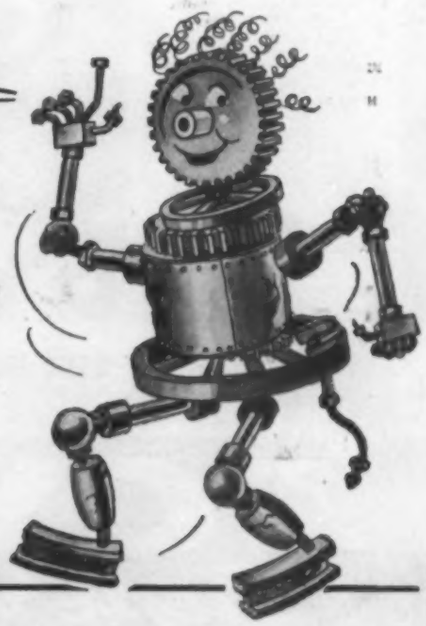
Comb plant and yards for dormant scrap and unusable and abandoned equipment.

Report promptly the equipment which is out of use. If equipment has not been used for some time, and you see no use for it in the near future, transfer it to where it can be used, or scrap it.

Salvage usable parts from equipment marked for scrapping.

SCRAPPY SAYS:

Yes sir, we've got to have scrap. It takes scrap to make steel. And it takes lots of steel to win a war. DO YOUR PART!



ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York, N. Y.

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BOMBS for VICTORY

Finished with

EGYPTIAN Lacquer Enamel

for Ammunition

(Cellulose Type)

★Meets U. S. Gov't Spec. PXS-979

For use as an exterior coating for bombs, shells, grenades and other ammunition components. An important new development which—

Complies with Amendment 2, dated June 23, 1942.

Dries rapidly at room temperature, since it is a lacquer type.

Covers clean metal *completely* in one spray coat.

Can be dipped as well as sprayed.

Comes in sheen range from eggshell to flat.

Comes in wide variety of colors conforming to Color Card Supplement to Specification No. 3-1, General Specifications for Paints and Related Materials. Also Supplied in Black.

Provides in Blue Gray No. 12 a covering which meets Salt Spray requirements of Specification PXS-655.

Meets PXS-979 Specification requirements as to ability to withstand heat, cold water, flexibility test, blush resistance. Is non-lifting.

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These are a few of the more important Government "Spec." finishes which we can furnish. For more complete list send for "Spec." book.

ES-680
SYNTHETIC TYPE
PROTECTIVE COATING

JQD-144
LUSTRELESS
BLACK BAKING
ENAMEL

AXS-736
CLEAR FINISH
FOR STEEL CARTRIDGE CASES

AXS-680
LUSTRELESS LACQUER ENAMEL
FOR AMMUNITION

AXS-694
TYPE I and II
LUSTRELESS PAINT FOR AMMUNITION

3-162-A
NITROCELLULOSE LACQUER ENAMEL
FOR AMMUNITION

P-37-b-2
ZINC CHROMATE PRIMER

84
ZINC CHROMATE PRIMER

AN-TT-P-656
ZINC CHROMATE PRIMER

★ PXS-979
LACQUER ENAMEL FOR AMMUNITION
(CELLULOSE TYPE)

THE EGYPTIAN LACQUER MANUFACTURING CO.
ROCKEFELLER CENTER—NEW YORK, N. Y.

EGYPTIAN
Superior FINISHES

Larger Ship Program Spurs Plate Mills to Capacity

New record seen for January as strip mills go all out. . . Tin plate makers fear congestion in second quarter as buyers delay. . . Scrap supply continues adequate

DEMAND
Slow in some products.

PRODUCTION
Advanced to 99 per cent.

PRICES
Unchanged.

INCREASED shipbuilding program this year is being reflected in larger plate demands and a new record may be established in January, following a request to strip mill operators to roll more plates than in December.

Three such producers will increase their output 75,000 tons over December and the top of 1,124,000 tons produced last July may be exceeded considerably. This expanded plate output will be largely at the expense of sheets, which already have begun to tighten.

Canmakers have been slow in placing orders for first quarter and the tin plate industry is operating at about 70 per cent at a season when normally it should be at capacity. Present activity is reducing order backlogs and production will decline if additional orders are not obtained. Much of the tin plate for cans to preserve early fruit and vegetable packs must be made during first quarter as demand in second quarter always is heavy for later packs.

• • •

Steelmaking scrap supply has ceased to be the immediate worry of recent weeks and in spite of bad weather conditions and shortage of labor mills are receiving sufficient tonnage for current operations and in some instances reserves are being enlarged. At the same time, with an eye to the future, efforts are being pressed without intermission to bring out dormant industrial scrap as production scrap is not sufficient to meet needs. With steel output planned to increase during 1943 supply of raw materials also must be greater. Quality of offerings averages better now than when most shipments were largely of light grades resulting from the household drive. Proportion of industrial scrap now is higher and melters find less difficulty on account of quality. Excess of machine shop turnings continues to make them a burden in some districts and price continues to be shaded to move them.

Steel production last week erased the last vestiges of flood interruption and rebounded 1½ points to 99 per cent, the level of the final week of December. Chicago gained 2 points to 102 per cent as repaired open hearths were lighted, Wheeling advanced 10 points to 80 per cent and Cincinnati 24 points to 97 per cent as the flood receded. Detroit gained 1 point to 93 and eastern Pennsylvania 1 point to 96 per cent. Pittsburgh dropped 1 point to 97½ per cent, Cleveland 2 points to 91 per cent, Buffalo 2½ points to 90½ and New England 5 points to 95. Youngstown maintained its rate of 97 per cent, St. Louis was steady at 93 and Birmingham at 95.

Warehouses find their condition much improved since shipments are being made on directives. However, demand is such that material moves out rapidly and assortments remain far from complete. Restrictions on building have resulted in heavier demand from warehouse stocks as more projects require tonnages too small for mills to handle. Shortage continues in many lines required in agricultural areas, fencing and wire, especially barbed wire, being far short of demand.

With only 135 domestic freight cars placed with builders in December total for last year reached only 26,028 units, a little more than 20 per cent of the number placed in 1941. This reflects the tight rein on materials held by the War Production Board, which froze all car orders early in the year and released only a few of the most pressing later. A number of requests for reinstatement of some of these orders are now pending before the board. Outlook for somewhat larger program this year is seen as railroads are in need of more rolling stock to meet demands of war transport.

• • •

To conserve new steel War Production Board is taking measures to concentrate reinforcing bar production in mills rerolling bars from rails. An order forbids mills in all states except those on the Pacific Coast from rolling reinforcing bars except in sizes not produced from old rails or of specifications not met by rail steel.

Pig iron production in December was 5,201,423 net tons, including 57,984 tons of ferromanganese and spiegeleisen, representing 101.1 per cent of capacity. For the year total output was 59,982,157 tons, an average of 99.2 per cent of capacity for the entire period. This is the highest output on record, 7.16 per cent greater than the previous high in 1941.

In trend with increased steel production last year United States Steel Corp. subsidiaries shipped finished steel products to a total of 21,064,157 net tons, the largest annual total in the organization's history. December shipments were 1,849,635 tons, highest for any December, and exceeded only by those of October, 1941, when they were 1,851,279 tons.

Composite steel and iron prices are unchanged from the level of recent weeks, held steady by OPA ceilings. Finished steel composite is $56.73, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Jan. 16	Jan. 9	Jan. 2	One Month Ago Dec., 1942	Three Months Ago Oct., 1942	One Year Ago Jan., 1942	Five Years Ago Jan., 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.18
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.92
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	14.10

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. **Semifinished Steel Composite:**—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. **Steelmaking Pig Iron Composite:**—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. **Steelworks Scrap Composite:**—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Jan. 16, 1943	Dec. 1942	Oct. 1942	Jan. 1942
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.49	2.49	2.49	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.22	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pittsburgh	2.00	2.00	2.00	2.00

Pig Iron

	Jan. 16, 1943	Dec. 1942	Oct. 1942	Jan. 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.39	25.39	25.39	25.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2X, del. Phila. (differ. av.)	26.265	26.265	26.265	26.215
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.54	31.54	31.54	31.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.65	140.65	140.65	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

Connellsville, furnace, ovens	$6.00	$6.00	$6.00	$6.20
Connellsville, foundry, ovens	7.25	7.25	7.25	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh base, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.25; Duluth (bil.) $36.00.
(Wheeling Steel Corp. allocated 21,000 tons 2" square, base grade rerolling billets under lease-lend during first quarter 1942 at $37, f.o.b. Portsmouth, O.; Andrews Steel Co. may quote carbon steel slabs $41 gross ton at established basing points.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.25; Duluth, $42.00.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel sheet bars at $39 gross ton, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.

Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.30 Galveston, $0.27. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.52c, all-rail 2.59c; Pac. ports, dock 2.50c; all rail 3.25c. (Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.) Josiyn Mfg. Co. may quote 2.35c, Chicago base. Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced on its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethhlehem, base 20 tons one size, 2.70c; Detroit, del., 2.82c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.55
		(.20-.30 Mo)	0.60
2300	1.70	4340	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.70	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3,35c; Detroit, del. 3.47c.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.72c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.27c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.22c; Phila. del. 2.28c; New York del., 2.35c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.17c; New York del. 3.41c; Phila. del 3.39c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.68c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage.

base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.
Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.22c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)
Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.92c; Worcester base 3.00c.
Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.
Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.
Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.
Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.
Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.
Roofing Ternes: Pittsburgh base per package 112 sheets, 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.30-2.55c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.49-.67c; Pacific ports, 2.65c; Gulf Ports, 2.47c. (Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. may quote plates at 2.20c, f.o.b. basing points.)
Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.
Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.
Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.28c; Phila., del., 2.22c; Gulf ports, 2.47c; Pacific ports, 2.75c. (Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points and 2.50c, Phoenixville, for export.)
Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c
Wire Products to the Trade:	
Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	.67
Do., 11 gage and heavier	.70
Barbed wire, 80-rod spool, col.	.70
Twisted barbless wire, col.	.70
Single loop bale ties, col.	.59
Fence posts, carloads, col.	.69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.: Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
⅝	66½	56	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled Steel	Cold Drawn Steel	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2½"	12	16.01	18.45	15.16	.....
2¾"	12	17.54	20.21	16.58	26.57
3"	12	18.59	21.42	17.54	29.00
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.
High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base, per lb.
18.00	4	1	-	67.00c
1.5	4	1	8.5	54.00c
	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
*317	50.00	54.00	58.00	50.00	58.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.
Extras mean additions or deductions from base prices in effect April 16, 1941.
Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.
Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.
Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.
Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine	
½ x 6 and smaller	65½ off
Do., ⅝ and ¾ x 6-in. and shorter	63½ off
Do., ⅞ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off
Stove Bolts	

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Semifinished hex.	Nuts U.S.S.	S.A.E.
⅞-inch and less	62	64
1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..
Hexagon Cap Screws		
Upset 1-in., smaller	64 off	
Milled 1-in., smaller	60 off	
Square Head Set Screws		
Upset, 1-in., smaller	71 off	
Headless, ¼-in., larger	60 off	
No. 10, smaller	70 off	

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
½-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens	
Connellsville, furnace	*$6.00
Connellsville, foundry	7.00- 7.50
Connellsville prem. fdry.	7.25- 7.60
New River, foundry	8.00- 8.25
Wise county, foundry	7.50
Wise county, furnace	6.50
By-Product Foundry	
Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $6.50, effective Aug. 12, 1942.
†$12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha	
Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do. less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	6.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.65	.....	.....	28.15
Birdsboro, Pa., del.	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	.....	.....
Baltimore, del.	25.67	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	‡24.47	.....	.....	.....
Cincinnati, del.	24.30	22.92	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.24	.....	.....	.....
Philadelphia, del.	25.51	25.01	.....	.....
St. Louis, del.	‡24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.17	24.67	25.67	25.17
Muskegon, Mich., del.	27.38	.....	.....	27.38
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.47	24.97	25.97	25.47
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.45	25.95	26.95	26.45
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.76	26.26	27.26	26.76
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.68	24.68	.....	25.35
Neville Island, Pa., base	24.00	23.50	24.50	24.00
‡Pittsburgh, del., No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	.....	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	26.05	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.89	25.39	.....	26.39
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	26.06	25.56	26.56	26.06
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. ‖For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling irons, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn. $28.00
Chicago, del. 31.54

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. 33.00

Gray Forge

Neville Island, Pa. $23.50
Valley, base 23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick	
Super Quality	
Pa., Mo., Ky.	$64.60
First Quality	
Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00
Second Quality	
Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00
Malleable Bung Brick	
All bases	$59.85
Silica Brick	
Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30
Ladle Brick (Pa., O., W. Va., Mo.)	
Dry press	$31.00
Wire cut	29.00
Magnesite	
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Basic Brick	
Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00
Fluorspar	

Fluorspar

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$25.00-28.00
Do., barge	25.00-28.00
No. 2 lump	25.00-28.00

(Prices effective Nov. 23, 1942)

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.65; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton and $18 for less than 200-lb. lots, packed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa, $36.

Electrolytic manganese: 99.9% plus, less ton lots, per lb. 42.00c. Ton lots 40.00c. Annual contracts 38.00c.

Chromium Metal: Per lb. contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c. Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: 66-70%; per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

	Car loads	Ton lots	Less ton	200 lbs.
2% C.	19.50c	20.25c	20.75c	21.00c
1% C.	20.50c	21.25c	21.75c	22.00c
0.20% C.	21.50c	22.25c	22.75c	23.00c
0.10% C.	22.50c	23.25c	23.75c	24.00c

Spot is ¼c higher

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

Molybdenum Powder: 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. $2.60; 100-200 lb. lots $2.75; under 100-lb. lots $3.00.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrophosphorus: 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

Spot prices ¼-cent higher.

Silicon Metal: Contract basis per lb., f.o.b. producers' plants, freight allowed; 1% iron; carlots 14.50c, ton lots 15.00c, less-ton lots 15.25c, less 200 lbs. 15.50c.

Silicon Metal: Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices ¼-cent higher.

Silicon Briquets: Contract basis; in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ⅛-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Contract basis freight allowed, 1½% carbon; in carloads per gross ton $135; ton lots $147.50. Spot $5 per ton higher.

Silico-manganese Briquets: Contract basis in carloads per pound, bulk freight allowed 5.80c; packed 6.05c; ton lots 6.30c; less-ton lots 6.55c; less 200-lb. lots 6.80c. Spot prices ¼-cent higher.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot 5 cents per lb. higher.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%, Contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Technical grade, 88-92 per cent V_2O_5; contracts, any quantity, $1.10 per pound V_2O_5 contained; spot 5 cents per pound higher.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) Contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c, Spot ⅛-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.50c; ton lots 11.00c, less ton lots, 11.50c.

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	AISI hot bars 2300 series	AISI hot bars 3100 series
Boston	3.98[1]	3.85[1]	3.85[1]	5.66[1]	3.71[1]	4.06[1]	5.06[1]	5.11[14]	4.68[14]	4.13[21]	3.46[21]	7.75[30]	6.05[30]
New York	3.84[1]	3.75[1]	3.76[1]	5.56[1]	3.58[1]	3.96[1]	3.96[1]	5.00[13]	4.60[1]	4.09[21]	3.51[21]	7.60[30]	5.90[30]
Philadelphia	3.85[1]	3.55[1]	3.55[1]	5.25[1]	3.55[1]	3.95[1]	4.45[1]	4.00[10]	4.63[10]	4.06[21]	3.31[21]	7.56[30]	5.86[30]
Baltimore (city)	3.85[1]	3.70[1]	3.70[1]	5.25[1]	3.50[1]	4.00[1]	4.35[1]	5.05[17]	5.00[10]	4.04[21]	..	....	....
Baltimore (country)	3.85[1]	3.70[1]	3.45[1]	5.25[1]	3.25[1]	4.00[1]	4.35[1]	4.75[17]	5.00[10]	4.04[21]	....	....	....
Washington, D. C.	3.95[1]	3.80[1]	3.80[1]	5.35[1]	3.60[1]	4.10[1]	4.45[1]	5.15[17]	5.10[10]	4.03[21]	..	....	....
Norfolk, Va.	4.00[1]	4.05[1]	4.05[1]	5.45[1]	3.85[1]	4.10[1]	4.10[1]	5.40[17]	4.50[21]	4.15[21]	....	....	....
Bethlehem, Pa.*	3.45[1]	....	....	....	....	....	....	....	....	....	....	....	....
Claymont, Del.*	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Coatesville, Pa.*	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Buffalo (city)	3.35[1]	3.40[1]	3.62[1]	5.25[1]	3.25[1]	3.82[1]	3.82[1]	4.75[15]	4.30[10]	3.75[21]	3.52[21]	7.35[30]	5.65[30]
Buffalo (country)	3.25[1]	3.30[1]	3.62[1]	5.25[1]	3.15[1]	3.82[1]	3.82[1]	4.65[15]	4.20[10]	3.65[21]	....	....	....
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[15]	4.00[24]	3.65[21]	....	7.45[30]	5.75[30]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[15]	4.00[24]	3.65[21]	....	....	....
Cleveland (city)	3.25[1]	3.55[1]	3.40[1]	5.18[1]	3.35[1]	3.50[1]	3.50[1]	4.62[15]	4.05[24]	3.75[21]	3.20[21]	7.55[30]	5.85[30]
Cleveland (country)	3.25[1]	3.55[1]	3.30[1]	5.18[1]	3.25[1]	3.50[1]	3.50[1]	4.62[15]	3.95[24]	3.65[21]	....	....	....
Detroit	3.43[1]	3.65[1]	3.60[1]	5.27[1]	3.43[1]	3.43[1]	3.68[1]	4.84[15]	4.30[21]	3.80[21]	3.40[21]	7.67[30]	5.97[30]
Omaha (city)	4.10[1]	4.15[1]	4.15[1]	5.75[1]	3.85[1]	4.20[1]	4.20[1]	5.52[10]	4.77[24]	4.42[21]	....	....	....
Omaha (country)	4.00[1]	4.05[1]	4.05[1]	5.65[1]	3.75[1]	4.10[1]	4.10[1]	5.52[10]	4.77[24]	4.42[21]	..	....	....
Cincinnati	3.60[1]	3.68[1]	3.65[1]	5.28[1]	3.42[1]	3.67[1]	3.67[1]	4.92[10]	4.37[24]	4.00[21]	3.45[21]	7.69[30]	5.99[30]
Youngstown, O.*	....	....	....	....	..	....	....	4.40[12]	....	....	....	....	....
Middletown, O.*	....	....	....	....	3.25[1]	3.50[1]	3.50[1]	4.40[12]	....	....	....	....	....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	4.85[10]	4.10[24]	3.75[21]	3.50[21]	7.35[30]	5.65[30]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.75[10]	4.00[24]	3.65[21]	....	....	....
Milwaukee	3.63[1]	3.68[1]	3.68[1]	5.28[1]	3.38[1]	3.73[1]	3.73[1]	4.98[10]	4.23[24]	3.88[21]	3.54[21]	7.33[30]	5.88[30]
St. Paul	3.75[3]	3.80[3]	3.80[3]	5.40[3]	3.50[3]	3.85[3]	3.85[3]	5.00[3]	4.35[3]	4.34[21]	3.83[21]	7.70[30]	6.00[30]
St. Louis	3.64[1]	3.69[1]	3.69[1]	5.29[1]	3.39[1]	3.74[1]	3.74[1]	4.99[10]	4.24[24]	4.02[21]	3.61[21]	7.72[30]	6.02[30]
Indianapolis (city)	3.60[1]	3.70[1]	3.70[1]	5.30[1]	3.45[1]	3.75[1]	3.75[1]	5.01[10]	4.25[24]	3.97[21]	....	..	....
Indianapolis (country)	3.35[1]	3.45[1]	3.40[1]	5.05[1]	3.20[1]	3.50[1]	3.50[1]	5.01[10]	4.00[24]	3.97[21]	....	....	....
Memphis, Tenn.	3.90[3]	3.95[3]	3.95[3]	5.71[3]	3.85[3]	4.10[3]	4.10[3]	5.25[11]	4.66[24]	4.31[21]	....	....	....
Birmingham (city)	3.50[3]	3.55[3]	3.55[3]	5.83[3]	3.45[3]	3.70[3]	3.70[3]	4.75[10]	4.78[24]	4.43[21]	....	....	....
Birmingham (country)	3.40[3]	3.45[3]	3.45[3]	5.83[3]	3.35[3]	3.60[3]	3.60[3]	4.75[10]	4.78[24]	4.43[21]	..	....	....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	3.95[4]	4.20[4]	4.20[4]	5.25[26]	4.95[10]	4.60[21]	5.00[21]	....	....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.75[4]	3.85[4]	4.10[4]	4.10[4]	5.15[26]	4.95[10]	4.60[21]	....	....	....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.75[3]	4.30[3]	4.30[3]	5.25[11]	5.43[10]	4.50[21]	....	....	....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[3]	5.95[10]	7.15[3]	5.70[22]	....	9.55[30]	8.55[30]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[10]	7.55[10]	5.55[10]	..	9.80[3]	8.80[3]
San Francisco (country)	3.85[7]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[10]	7.45[10]	5.45[22]	....	....	....
Tacoma	4.20[3]	4.45[3]	4.75[3]	6.50[3]	4.65[3]	4.25[3]	5.45[3]	5.70[3]	6.63[24]	5.75[22]	....	....	....
Seattle (city)	4.20[3]	4.45[3]	4.75[3]	6.50[3]	4.65[3]	4.35[3]	5.45[3]	5.70[3]	6.63[24]	5.75[22]	....	....	8.00[3]

*Basing point cities against which warehouses equalized freight as of April 16, 1941, and which must now be used in calculating lowest combination prices.

NOTE—All prices except cold-rolled strip and AISI hot-rolled bars fixed by Office of Price Administration in amendment No. 10 to Revised Price Schedule No. 49.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—300 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles.

Ores

Lake Superior Iron Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(5/3 paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	27.40
45% no ratio	28.70
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (f.o.b. Columbus, Mont.)	
48% 3:1	43.50
less $7 freight allowance	

Manganese Ore

Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.5c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	96.0c

NATIONAL EMERGENCY STEELS (Hot Rolled)

Extras for Alloy Content

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Bars per 100 lb.	Basic open-hearth Billets per G T	Electric furnace Bars per 100 lb.	Electric furnace Billets per G T
	Chemical Composition Limits, Per Cent									
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....	.....	$ .10	$2.00	....	....
NE 8020	.18-.23	1.00-1.30	.20-.35	.....	.....	.10-.20	.45	9.00	3.95	$19.00
NE 8339	.35-.42	1.30-1.60	.20-.35	.....	.....	.20-.30	.75	15.00	1.25	25.00
NE 8442	.40-.45	1.30-1.60	.20-.35	.....	.....	.30-.40	.90	18.00	1.40	28.00
NE 8618	.12-.17	.70- .90	.20-.35	.40-.60	.40-.60	.15-.25	.75	15.00	1.25	25.00
NE 8720	.18-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
NE 8949	.45-.50	1.00-1.30	.20-.35	.40-.60	.40-.60	.30-.40	1.20	24.00	1.70	34.00
NE 9255	.50-.60	.75-1.00	1.80-2.20	.....	.....	.....	.40	8.00	....	....
NE 9262	.55-.65	.75-1.00	1.80-2.20	.20-.40	.....	.....	.65	13.00	....	....
NE 9415	.13-.18	.80-1.10	.40-.60	.20-.40	.20-.50	.08-.15	.80	16.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.40-.60	.20-.40	.20-.50	.08-.15	.85	17.00	1.35	27.00
NE 9537	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00
NE 9630	.28-.33	1.20-1.50	.40-.60	.40-.60	.....	.....	.80	16.00	1.30	26.00
NE 9642	.40-.45	1.30-1.60	.40-.60	.40-.60	.....	.....	.85	17.00	1.35	27.00

Extras are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semifinished. No prices quoted on vanadium alloy.

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

	ELECTRIC FURNACE AND FOUNDRY GRADES													
				Low Phos. Grades										
	OPEN HEARTH GRADES*	Machine Shop Turnings	BLAST FURNACE GRADES*	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	Heavy Structural, Plate 2 ft. and less	Heavy Structural, Plate 1 ft. and less	Cut Auto Scrap 3 ft. and less	Cut Auto Scrap 2 ft. and less	Cut Auto Scrap 1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$16.00	$16.00	$25.00	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Bethlehem	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Buffalo	19.25	15.25	15.25	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	15.50	15.50	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Detroit	17.85	13.85	13.85	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo	....	13.85	13.85	....	....	....	....	....	....	....	....	....	....	....
Chicago	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Kokomo	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth	18.00	14.00	14.00	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
St. Louis	17.50	13.50	13.50	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	13.00	13.00	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle	14.50	10.50	10.50	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	$21.00	$22.00	$23.50	$24.00	$24.25	$24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	17.50	18.50	19.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

***Open Hearth Grades** refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. **Blast Furnace Grades** prices refer to mixed borings and turnings, shoveling turnings, and cast iron borings.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $2.50 less (railroad grades $3.50 less; material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grades of prepared scrap." Graveyard autos not considered unprepared scrap.

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah. Delivered price may exceed by not more than $5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $5 the nearest basing point price. Colorado scrap is remote scrap for Colorado consumers only.

Sheets, Strip . . .

Sheet & Strip Prices, Page 102

In some instances sheet deliveries are a little easier while in others the reverse is true. New buying appears lighter and where producers are not being called upon to divert more of their strip capacity to plates, their shipments are better. One mill, which not long ago, was unable to offer delivery on hot sheets before March, now on AA-2 ratings and higher can offer shipment in the third week in February and on cold sheets, shipment in late March and early April, which is the same promise made a fortnight ago. Those which have had to take on more plate tonnage this month find schedules set back a week to ten days, and in at least one instance, longer. Generally speaking, about the best that can be done on hot-rolled sheets is five weeks and in cold-finished about the same.

Deliveries of black steel sheets late last year to numerous fabricators being somewhat heavier, new buying is inclined to lag with most producers of cold-finished seeking orders. The supply situation is spotty. Mills with capacity substantially engaged on plates can not fill orders for heavier gages and some producers are in a much easier position on both light and heavy material than others. On the whole, inventories with direct consumers and warehouses are larger and in better balance. Galvanized are as tight as ever, but demand is also light, use being restricted under the M-126 order and slack building requirements, corrugated being notably affected.

Acute shortage of fuel oil in the East, particularly in New England, has caused increased use of heavy steel sheets in fabrication of fireplace grates and heat reflectors. A fabricator at Watertown, Mass., is doing a brisk business in these grates.

New orders for narrow cold strip, while off slightly with some producers, are still a shade ahead of shipments and sufficient volume has been booked thus far this quarter to force more rescheduling than expected. Contracts during the first full week of January were substantially higher. On numerous widths and finishes, rerollers are sold full for the next three months and that part of new volume wanted during that period brings about revised production schedules. In this directives are operative frequently. In some instances mill quotas have been made more flexible to meet the demand. Nevertheless, some extensions in shipments of cartridge steel, clips and links, has followed revisions in the small ammunition production program. Production of strip for cartridge requirements has been growing steadily with a greater number of fabricators getting into heavier consumption. Hot strip deliveries on directives are fairly well maintained.

Plates . . .

Plate Prices, Page 103

A new plate production record may be established this month, considerable speculation being made on this possibility, as strip mill operators have been called on to roll more plates this month than last. Three producers alone will roll 75,000 tons more plates than in December. The monthly production to date has been about 1,100,000 tons, with a top of 1,124,000 tons in July.

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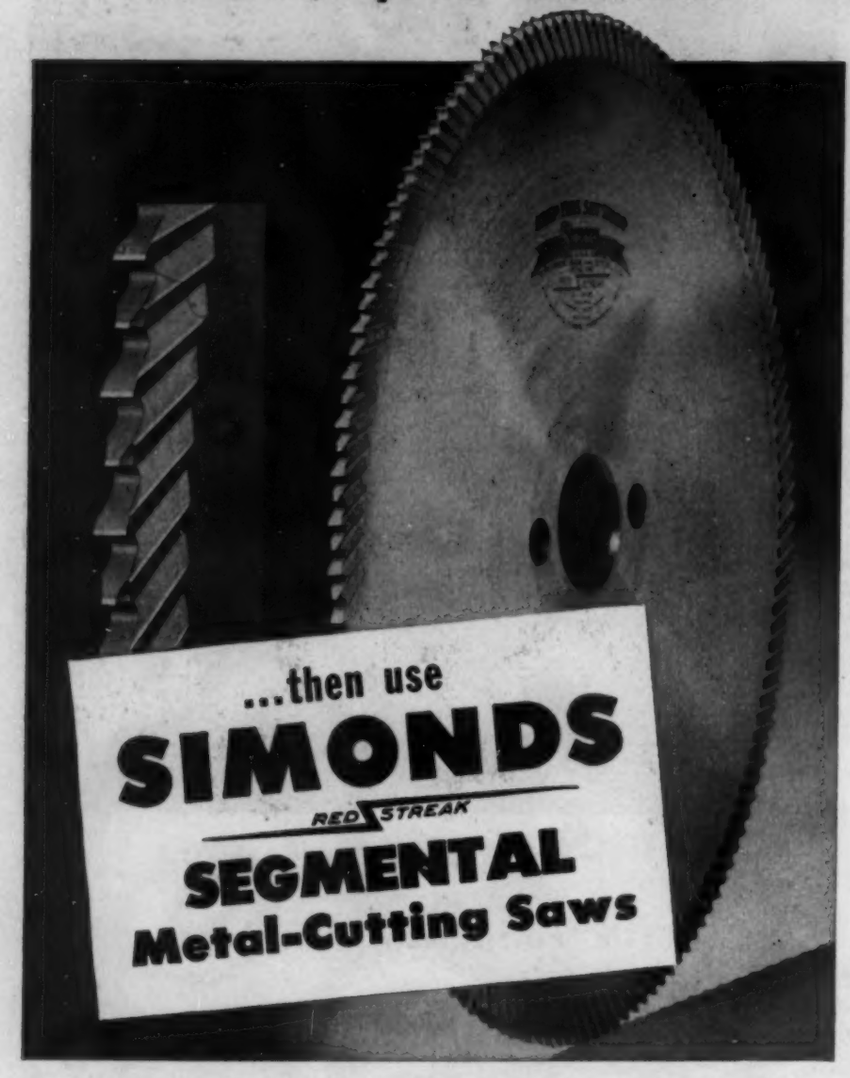

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Further conversion of strip capacity to plates has been at the expense of sheets.

Sub-contracting shops engaged in ship fabrication are in receipt of heavier plate shipments, inventories with some reflecting the increased construction program. Deliveries to shipyards are also scheduled heavier late this month and probably for February. Resellers in some cases are rather heavily stocked on odd sizes, shipped in volume early last quarter, which are not moving as briskly as expected. Most warehouses are short of standard stock sizes for which demand is maintained. Until current inventories of odd sizes are partially liquidated, distributors are not taking in any more odd-size tonnage.

Bars . . .

Bar Prices, Pages 102

Supply of cold-finished and alloy steel bars has not eased perceptibly. Split car lots are frequently delivered to warehouses, half cold-drawn and half alloys, the latter made up substantially of NE grades. Some mills could supply heavier allotments of small sizes to cold-finishers, but are confined to allocations, although in spots shipments of small diameters are increasing. Heavy flats are in strong demand. Hot carbon bars, notably smaller sizes, continue easier. Aircraft, forging and machine tool demand is active, although the latter, through jobbers, are less pinched for steel than formerly. Distributors are in a better position on tool steel than on most grades. Consumption for small shells has slackened. The volume of screw machine work is heavy, most available equipment engaged, while prime contractors in some instances are seeking to place additional multiple-spindle subcontracts.

Cold-drawn bar producers, it is understood, have been advised by Washington that they can order from hot bar mills certain stipulated amounts of bessemer in addition to their present monthly allocations of hot bars. In some cases at least they have been permitted to order several hundred tons additional.

Trade interests recall the drive Washington has been making for the greater utilization of bessemer steel, and see in this another measure for encouraging its use. In the past the War Production Board has urged cold drawers to use more bessemer, pointing out that not nearly as much of this type of steel was being processed in relation to open hearth as in former years. Cold drawers responded usually that they had to be guided by the specifications of the consumers, notable among which for months past were the government procurement agencies. In fact, it was emphasized, it was these agencies which were largely responsible for such shifting to open hearth as had been made.

Cold drawn bar interests have contended that various specifications could be changed to bessemer. But the change has been slow. Meanwhile, jobbers have been having difficulty in getting cold-drawn bars, and it is understood that Washington has referred to them as being a particularly desirable outlet for cold-drawn bessemer steel. However, (and this is a noteworthy case of government specifications being applied to bessemer), there is an increasing volume of this steel being required for 7/16-inch machine gun bullets, although due primarily to bigger orders than to any particular change in specifications. Screw machine companies have substantial or-

ders and more are constantly being figured on.

Pipe . . .

Pipe Prices, Page 103

Slightly larger allocations under directives will allow most small jobbers more pipe this quarter than last, but beyond directive tonnage, shipments against extended ratings will be limited. On the other hand, those with high ratings have extended them against a somewhat lagging demand for butt-weld with direct lap-weld shipments lower. Price shading continues in spots; re-sellers who were cutting in April, 1941, are held to those quotations by regulatory ceilings. Outside of directives, replacements tend to converge toward higher ratings and are practically stabilized at levels on that basis. Some of these ratings were originaly linked to tonnage on which prices were shaded. Quotations are in on a large tonnage of steel, copper and brass tubing for Portsmouth, N. H., inquiry for steel bringing out few tenders and none for the galvanized steel pipe included.

Shipments of 24-inch steel pipe for the Illinois-East Coast extension of the Texas-Norris City, Ill., line are at a rate of approximately 200 cars or 26 miles of pipe a week; already more than 100 miles of pipe has been moved to storage sites along the route. The eastern extension will be 24-inch from Norris City, Ill., to Phoenixville, Pa., where two 20-inch branches will run to the refining areas at Bayway-Bayonne, N. J., and Philadelphia. The extension, 857 miles long, will be completed this summer for the delivery of 300,000 barrels a day.

Wire . . .

Wire Prices, Page 103

Slight revision upward in wire mill directive quotas has followed heavier contracts for some finished products required for expanding production in certain war needs; others, to meet deliveries on new tonnage, are confronted with further revision of schedules, the need of higher quotas or both. In any event, some tonnage, to make room for this volume, may be extended; on numerous wires, mills are sold through the quarter at capacity. New orders are in excess of shipments and some finishing departments under pressure are operating seven days per week, while others lag, notably low carbon flats, although for some purposes carbon wire is replacing stainless.

Demand for heavy wires is strong, also for fine wire specialties going into war fabrication, but sizes in between, applicable largely to wire goods manufacturing and civilian specialties, are slow. New contracts reflect expanding aircraft needs and some ordnance branches; rope mills and balloon barrage cable maintain heavy consumption for standing. Rod distribution is on directives; heavier sizes are tighter than small diameters, but on top ratings nonintegrated mills are getting semifinished. Directives also apply to more finished wire volume and rated orders, on which shipment is more definite, range in higher brackets.

For some items producers have considerable volume for indefinite periods or duration contracts against which specifications tend to increase each month; more alloys are in this category. While nail production has been close to 60,-

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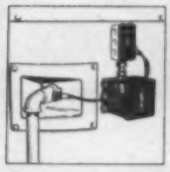
2 WEEKS DELIVERY



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Burners, near top of 575 combustion chamber, insure longer pot life. Large blower for maximum performance; vent damper regulates flow of exhaust gases. Electric ignition may be used in conjunction with photo-electric safety system for complete protection from possible explosions due to gas failure. Top ring, in 3 sections, to prevent cracking or distortion. Price.....$315.00—Blower Extra.

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000 tons a month over an extended period, demand has not eased and most production is going directly into consumption, with jobber deliveries limited.

Tin Plate . . .

Tin Plate Prices, Page 103

Efforts are now under way in Washington to release a larger volume of orders for tin plate for domestic can production during first quarter. Current orders are slow and mills are not able to convert their entire January steel quota. The resulting carryover probably will reduce February requirements.

Tin plate production for the whole industry is at about 70 per cent, although first quarter production normally is close to capacity. Much of the tin plate for early fruit and vegetable packs must be finished during the early months to enable canmakers to provide cans. The present production rate is reducing order backlogs and unless much additional business is placed soon this can not be continued.

Fairly large export orders, which have been hanging fire for some time, expected since December, have not materialized. Some action has been apparent recently and the orders may come through soon. There is no question as to the heavy volume of tin plate necessary for domestic and export demand. Close to capacity production must be maintained during the next few months to provide cans for various packs as they materialize.

Progress on electrolytic tinning lines is slow and pressure for electrolytic plate is heavy. One new line and one old line now are in operation, which do not begin to take care of the volume of tin plate which can be produced only on electrolytic lines under limitation orders of the War Production Board. Producers of material which cannot be packed in hot dip tin plate cannot expect much relief from this situation during first half. Technical difficulties in the establishment of electrolytic and bonderizing lines are being ironed out but there now seems little possibility that any substantial number of these units will be in operation during first half.

Rails, Cars . . .

Track Material Prices, Page 103

Domestic freight car awards in 1942 totaled 26,028 units, compared with 121,499 in 1941, 66,889 in 1940 and 57,775 in 1939. The sharp decline over the past year reflected limitations placed on car building in an effort to conserve steel and other materials. Last spring many orders were frozen and some of these only now are being permitted to go ahead. In fact, of the 20,000 approved by WPB for construction in the first half of this year, a large percentage will represent orders which had been frozen, with specifications in many cases changed to provide for composite type.

In December only two small orders were approved, making a total of 135 cars. Certain other orders were placed, but pending approval of WPB. Still another order involving 1000 composite gondolas for the Union Pacific was reported, but this proved to be a revision of a previous order calling for all steel construction.

Further comparisons follow:

	1942	1941	1940	1939
Jan.	4,253	15,169	360	3
Feb.	11,725	5,508	1,147	2,259
March	4,080	8,074	3,104	860
April	2,125	14,645	2,077	3,095
May	822	18,630	2,010	2,051
June	0	32,749	7,475	1,324
July	1,025	6,459	5,846	110
Aug.	0	2,668	7,525	2,511
Sept.	1,863	4,470	9,735	23,000
Oct.	0	2,499	12,195	19,634
Nov.	0	2,222	8,234	2,650
Dec.	135	8,406	7,181	35
Total	26,028	121,499	66,889	57,775

Structural Shapes . . .

Structural Shape Prices, Page 103

Because of the relatively small volume of building and strict regulations against use of steel in virtually every form for new construction, demand is light. Structural fabricators report that although their plants are fairly active at the moment, they are rapidly consuming the small backlogs and expect a rapid decline in operations before the end of first quarter.

This situation is also borne out by fabricators of steam piping systems. The unprecedented volume of new business during 1942 in industrial steam piping has left these fabricators with fair backlogs, but new business is virtually at a standstill and salesmen are again trying to develop additional tonnage.

The shipbuilding program now represents the largest single source of busi-

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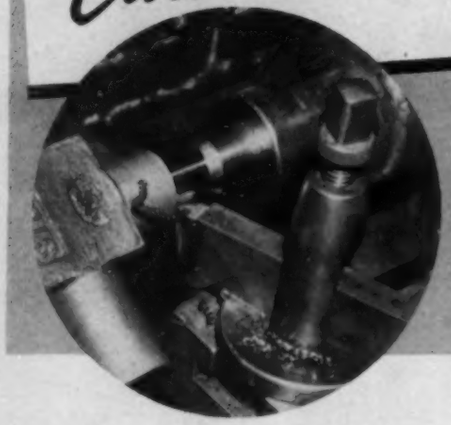
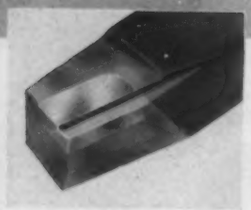
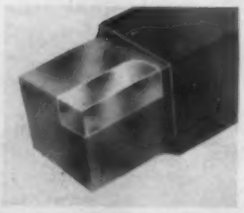


Per bag of Tungsten Consumed



STYLE II



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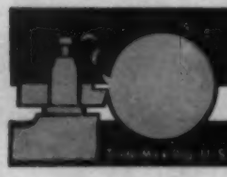

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ness in structural shapes and similar construction items. Small shapes for industrial purposes are moderately active but demand does not approach that experienced in bars.

Shape deliveries have stiffened materially as a result of diversion of steel to other products under WPB orders. A fortnight ago delivery in three or four weeks was promised on ratings as low as AA-3 but six weeks now appears about the earliest and on ratings no lower than AA-2. Shape mills are engaged principally on ship tonnage, which does not use a major part of capacity. Some producers normally using most steel production on shapes are selling ingots and semifinished to others. This tends to relieve some forgers who have been having difficulty getting steel.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 103

A large part of concrete reinforcing bar production will be concentrated in steel rail rerolling mills as a result of an order by the steel division of WPB. The order prohibits mills except in California, Washington and Oregon, from rolling reinforcing bars, except in sizes not regularly produced by rerolling mills or in specifications which can not be met by rail steel quality. Directives limit operations of rerolling mills to 40 hours per week.

Because of rapid decline in demand, the War Production Board is expected to issue shortly an order prohibiting reinforcing bar fabricators from purchasing new billet bars in sizes less than one inch. This action is to maintain operations for rerolling mills because it is felt their function may be necessary later in the war effort.

Fabricators now hold stocks of about 100,000 tons in random lengths. Replenishment of this stock may be made in rail bars only in sizes specified, although new billet mills will continue to ship against orders already on books.

Total new business placed during December on both rail and new billet bars amounted to less than 20,000 tons. January tonnage will be slightly better, due to foreign buying, but domestic business continues to decline and will probably be nearer 15,000 tons than 20,000 tons in January.

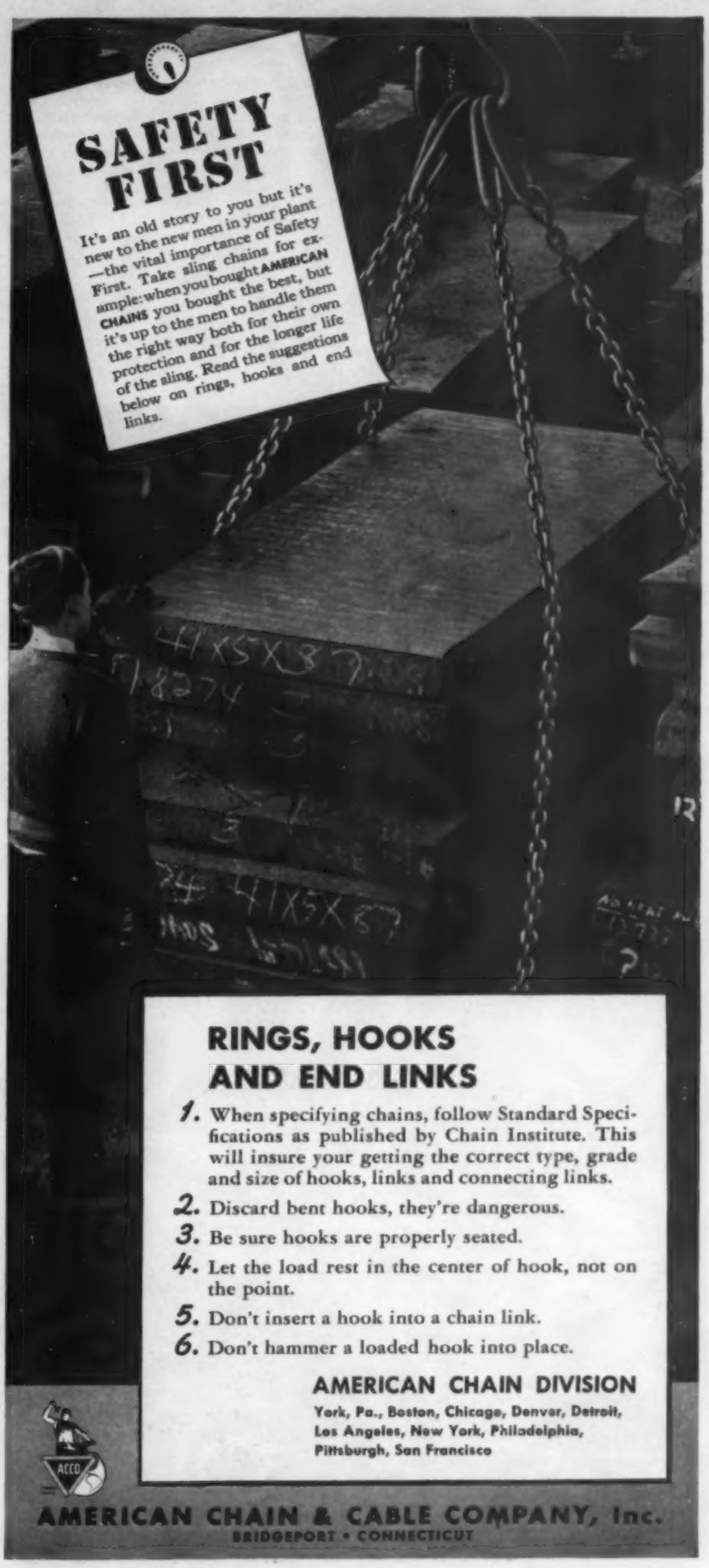
Directives for January against new billet mill backlogs totaled only 46,000 tons. Estimated backlogs total two to three times this amount, and it is not yet clear whether the entire balance of unshipped orders will be produced or whether part of it will be converted to rail bars.

This order brings up a new cost problem for independent fabricators. Price on new billet bars in random lengths has been established at $1.90 per 100 pounds. Rail mills have not been accustomed to selling straight bars in random lengths but only fabricated bars, on which the going price is $2.15 to $2.25 per 100 pounds. Ceiling price on this commodity is $2.40 per 100 pounds, although lack of business has caused weakness which does not permit sales at the full ceiling price.

Pig Iron . . .

Pig Iron Prices, Page 104

Gray iron foundries engaged in war work continue relatively busy, but there are indications that additional business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2. Discard bent hooks, they're dangerous.
3. Be sure hooks are properly seated.
4. Let the load rest in the center of hook, not on the point.
5. Don't insert a hook into a chain link.
6. Don't hammer a loaded hook into place.
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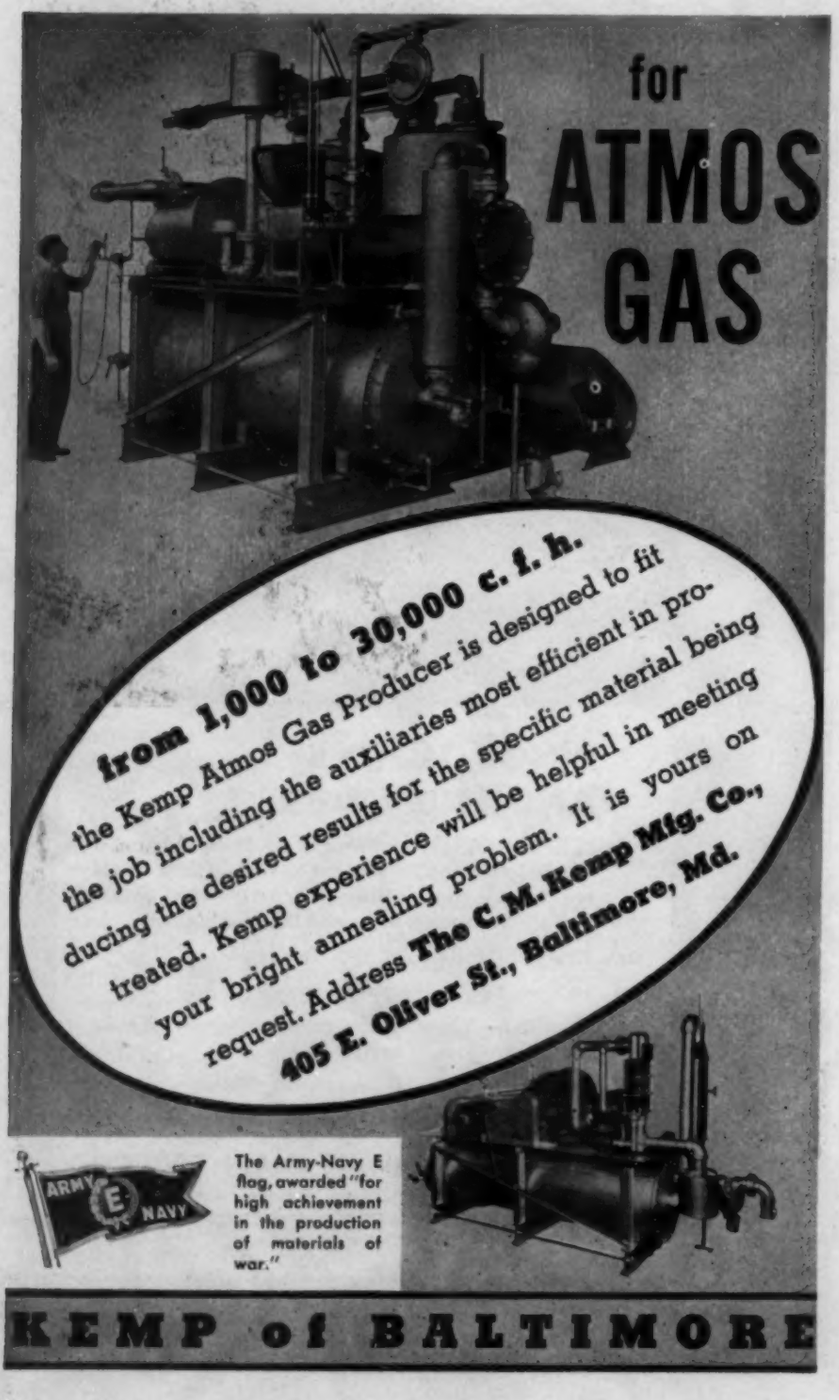
will be required before mid-year to offset the anticipated lag in demand from machine tool builders. An occasional instance already has appeared of increased competition for existing business, with resultant pressure on prices quoted for castings.

Machinery and machine tool manufacturers still have heavy backlogs that will help to sustain active operations throughout the year although they will not duplicate the huge volume of new orders which prevailed the past 12 months. Consequently, castings requirements will remain heavy despite the fact the peak in demand for most items appears to have been reached, if not passed.

Because of suspension of production of so many civilian items, the proportion of machine tool castings to total gray iron foundry melt is materially above its usual ratio, a trend also accentuated by the phenomenal expansion in tool production. Some estimates are that as much as 75 per cent of production in some districts represents machine castings, with the result that any tapering in demand will be reflected quickly in foundry schedules.

Pig iron distribution has settled into a smooth-working routine. Pig iron is not one of the controlled materials under CMP and is not affected in the same manner as are steel products by the approaching switch to the new system of distribution.

Having leveled off several months back, some easing in pig iron requirements for foundries is developing, which may help the situation as to basic by spreading steel-mill allotments among one or two additional suppliers. Foundries supplying the machine tool industry, having kept well up to heavy pressure for castings over an extended period, are experiencing a mild slackening in spots. While requests for iron vary little each month, the trend toward higher ratings holds. Carryover each month with most melters is small, which taken into consideration with allocations, allows an inventory of 35 to 40 days. Deliveries against schedules are generally cleaned up by the end of each month, with scattered exceptions as to analysis, sometimes subject to a few days delay.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KEMP of BALTIMORE

Scrap . . .

Scrap Prices, Page 106

As a whole the situation in scrap is comfortable in spite of weather conditions and lack of labor for yard preparation. Consumers have some reserves and in most cases are able to operate on current receipts. The specter of possible shortage in the late winter is constantly before the industry and serves as a spur to expedite salvage of all material possible to obtain.

Steelmaking scrap is of somewhat better grade than a few weeks ago, the light scrap from household collections being balanced by heavier material from industrial sources. Surplus of machine shop turnings continues to make trouble in some districts where production exceeds ability of melters to absorb them. Price concessions to move turnings continue.

As a rule steel mills are accepting all material offered, adding to reserves. In the case of some foundries stocks are large and further shipments are refused.

Salvage efforts on the part of government agencies, aided by volunteer workers, such as steel warehouse salesmen, continue to seek out dormant scrap and to finance material on which cost of reclamation exceeds the market return.

Pittsburgh steelmakers have adequate supply though receipts are currently lighter than a month ago, because of cold weather. No restraint has been placed on shipments to any point and stocks are maintained. Indications are that supply may begin to drop off shortly. Industrial Salvage Section reports that industrial scrap is lessening from dormant and production sources. The pinch is expected in early February and efforts are under way to increase supplies and avoid shortage.

Operators of scrap yards in the St. Louis district find labor the most acute problem, men being drained off to industrial work and country yards find truck transportation difficult for the same reason. Movement by railroads has been better in recent days. Salvage efforts of steel salesmen has been fairly productive of obsolete materials.

Buffalo dealers are receiving less country scrap because of weather conditions and are pushing preparation of yard supplies, which are sufficient to keep them busy 60 to 90 days. Oversupply of machine turnings continues in this district and consumers are taking only small lots.

Automotive Council for War Production has compiled statistics showing that for six months ending Nov. 30 automotive plants collected 716,928 tons of metal scrap, of which 674,965 tons were steel and iron. Of this total 77,190 tons

consisted of non-production scrap, such as discarded tools, dies and machinery. General Motors plants report a 2000-ton increase in November scrap collections, compared with October. In 11 months of 1942 more than 500,000 tons of salvage material was sold by General Motors plants and dealers. November collections by this interest totaled about 50,000 tons, 46,180 tons being steel and iron, 4460 tons the result of intensified housecleaning drives.

In the East most scrap consumers are well supplied, with the possible exception of heavy breakable cast and even in this the situation is easing as a result of shrinking demand for cupola cast. Most yards have been breaking heavy cast to cupola size in order to obtain the $2.50 premium. Recent drop in this demand has been met. Three large pipe foundries have held up shipments on cupola scrap, attributable to freer movement and to curtailment in pipe production. No. 2 bundles and machine shop turnings are in excess supply. Less scrap is moving to Pittsburgh and eastern Ohio, indicating an easier position there. Some allocated tonnage has been rejected as mills can not accommodate it.

Iron Ore . . .

Iron Ore Prices, Page 103

Office of Defense Transportation has set the 1943 iron ore movement goal on the Great Lakes at 101,000,000 tons, a total far above any previous performance. Captain T. Howard Saunders, chairman of the navigation and legislation committee of the International Shipmasters' Association, announced this goal after a recent visit to Washington. He said the government is well pleased with the 1942 ore movement of more than 92,000,000 tons.

Captain Saunders said: "We've got a big job ahead of us but we expect to carry out the ODT's order if it's humanly possible to do so. All we need is a break in weather conditions, a minimum of delay for repairs and some fast loadings and unloadings, with an absence of accidents which might remove ships from service."

Bolts, Nuts, Rivets . . .

Bolt, Nut, Rivet Prices, Page 103

With building activity tapering rapidly, bolt and nut manufacturers report a decided lag in construction sizes. Shipyard and general industrial requirements, on the other hand, continue heavier, and while the gain has not offset the drop in construction needs, in point of tonnage, bolt and nut manufacturers are still having difficulty obtaining steel, particularly larger rounds, most anything from 1¼ to 1½ inches and up. However, delivery promises this month are a little easier than in December. There is better interest in bessemer, as various users who have relied principally on open hearth steel are becoming more acquainted with bessemer, as a result of better deliveries offered.

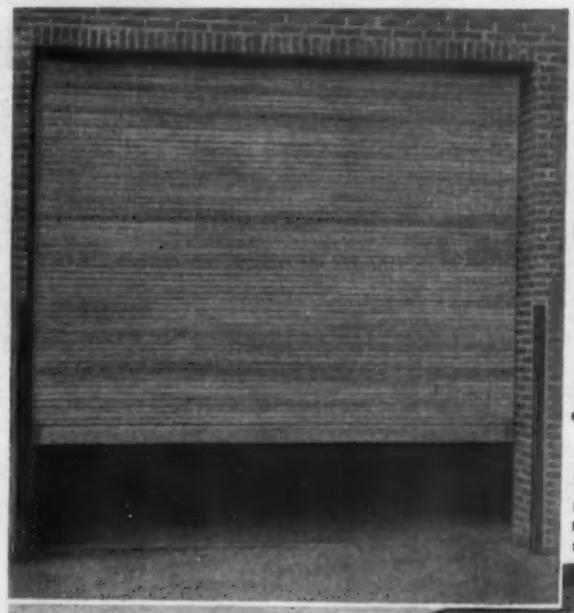
Steel in Europe . . .

London—(*By Radio*)—Wide demand for light structural sections is developing in Great Britain and delivery is being extended on some products. Shipbuilding needs are increasing as a result of the heavier program. Heavy grades of scrap are being absorbed but lighter material is accumulating.

Canada . . .

Toronto, Ont. — Labor troubles are causing new uneasiness to government heads as well as to officials of Canadian steel and war plants, the main discussion being higher basic wages and sustained or higher rates for overtime. The majority report of the three-man commission investigating rates of pay for workers at the steel mills of Algoma Steel Corp. Ltd., Sault Ste. Marie, Ont., and Dominion Steel & Coal Corp. Ltd., Sydney, N. S., recommended that there should be no increase in the base rates of pay, except for maintenance men. As a protest some 5000 workers on the day shift at Dominion Steel & Coal Corp. walked out on Tuesday, while workers at the Sault Ste. Marie steel works are considering what action will be taken. The walk-out at Sydney will result in about 30 per cent decrease in iron and steel production for Canada, and a strike at Sault Ste. Marie would bring total curtailment of production to about 65 per cent.

With many companies engaged in inventory taking, interest in iron and steel markets has been slow during the past week or two. Mill representatives, however, state that this condition is seasonal and are getting ready to handle a record volume of buying which they expect to develop before the end of the month. There is no slackening in consumption of finished and semifinished



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You get these things in the Kinnear *Wood* Rolling Door. It features the same space-saving upward action — the same time-saving convenience — as the famous Kinnear Steel Rolling Door. It opens vertically and coils compactly above the doorway, where it *stays* out of the way and out of reach of damage until closed.

Motor operation is also available, and one or more remote control stations can be located at strategic points to further facilitate traffic control.

The Kinnear Wood Rolling Door is constructed of rugged wood slats interlapped and jointed with metal cables or tapes—a construction that affords free action but blocks out wind and weather and stands up under heavy usage. Write for full details today! The Kinnear Manufacturing Company, 1780-1800 Fields Avenue, Columbus, Ohio.

SAVING WAYS IN DOORWAYS KINNEAR ROLLING DOORS

steel and mills are maintaining a steady flow of steel to the war plants. A few important inquiries have appeared, indicating that war plants soon will be in urgent need of steel. As far as production is concerned war plants have fully recovered from the holidays and are preparing for further increase in output. Imports of steel from the United States are gaining in volume, but owing to censor restrictions on information of this nature, actual tonnages and items imported are not available. According to information gathered in reliable quarters, imports of various steel materials from the United States last year exceeded all previous records by a wide margin, and under the present set-up they will show further improvement this year.

Although plate mills are assured of market for all output for the duration, and are maintaining production well above rated capacity, fresh orders continue to appear. All plate deliveries are under strict control and shipments are being made at regular intervals to the more important consumers. Shipbuilding demand is increasing, and it is stated that there is a large flow of plate of various sizes to the new government synthetic rubber plant under construction at Sarnia, Ont. It is estimated that rolling stock orders on books now exceed $40,000,000 and while some plate and other lines of steel are being made available to these consumers, production of freight cars and locomotives is far behind schedule.

New interest developed in merchant bars during the past few days, but sales still are below normal. New orders for carbon and alloy bars are mostly for delivery in three or four months, and Canadian mills are unable to give definite delivery promises against fresh commitments. A number of smaller users have been obtaining supplies from warehouses, but stocks of this nature are comparatively light.

Structural steel fabricators are steadily swinging over to production of shapes for shipbuilding and report a general slowing down in demand for shapes for new building projects. Most fabricators report large backlogs on shipbuilding account, and plants are running at virtual capacity.

Demand for merchant pig iron showed some betterment, with sales totaling close to 8000 tons, including about 1000 tons of basic iron for electric furnace use. The growing shortage of iron scrap is largely responsible for the improvement in iron sales and local blast furnace representatives look for still heavier buying to continue throughout the winter.

Trading in scrap iron and steel was dull and listless, with receipts by local dealers down about 50 per cent from the high of last month. No deliveries were reported from rural districts and transportation and communications to the farming areas still are seriously affected by snow. Offerings from war plants and other producers also are below normal.

Despite the sharp drop in receipts, shipments to consumers are again on a more normal basis. Dealers are giving full time to cleaning their yards of the large piles of scrap accumulated late last fall. Mills are still drawing heavily on stocks for current needs. Iron scrap materials are scarce and only small quantities of cast scrap and stove plate have appeared and some dealers state they are unable to meet needs of customers.

Magnesium Ingot Price Reduced 2 Cents a Pound

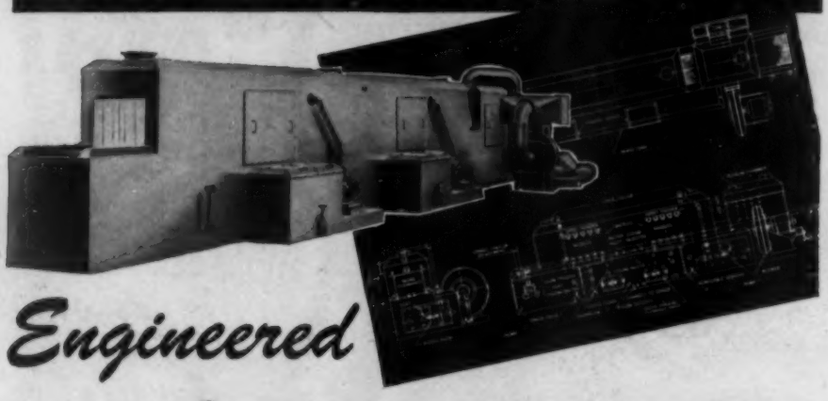
Substantial savings to the government in the cost of airplanes and other vital war materials are expected to result from a reduction of 2 cents per pound in the base price of virgin magnesium, and other reductions by the Dow Chemical Co.

Reductions were made at the request of OPA and were made possible by economies in production about by the increased volume due to war needs. They became effective Jan. 1.

Besides setting a base price of 20½ cents a pound for virgin magnesium metal ingot, instead of the former 22½ cents, the company has reduced all alloys correspondingly. It is also reducing prices on the majority of its volume-production magnesium castings, aircraft sub-assemblies, and magnesium melting fluxes and protective agents.

The Dow Chemical Co. has pioneered the production of magnesium over the past two or three decades and at present is the largest producer.

DETREX METAL PARTS WASHERS



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Detrex Washers—using alkali cleaning compounds, petroleum spirits or emulsion cleaners—are engineered to the customer's need. Incorporated is every detail which can contribute to long life and high efficiency.

Among the features of Detrex Washers are heavy, reinforced construction; balanced heat input; fully effective drying equipment, and proper directional spraying. Large access doors permit easy inspection, cleaning and adjustment of spray nozzles. Each washer with self-contained conveyor is equipped with variable speed drive. Conveyors used include monorail, slat belt and roller types.

Various models of Detrex Washers are pictured and described in the new catalog—"Detrex Metal Parts Washers". Write for your copy.

Four stage alkali spray washer with monorail conveyor. Used in cleaning of gun barrels, mounts and miscellaneous parts.

Single stage, through type, spray washer built with mesh belt, slat type or double strand conveyor.

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Nonferrous Metal Prices

Jan.	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York: Spot	Straits Tin, New York: Futures	Lead: N. Y.	Lead: East St. L.	Zinc: St. L.	Aluminum 99%	Antimony: Amer. Spot, N.Y.	Nickel: Cathodes
1-14	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	14.50	35.00

F.o.b. mill base, cents per lb. except as specified. Copper and brass products based on 12.00c Conn. copper

Sheets	
Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.75
Zinc, l.c.l.	13.15
Tubes	
High yellow brass	22.23
Seamless copper	21.37
Rods	
High yellow brass	15.01
Copper, hot rolled	17.37
Anodes	
Copper, untrimmed	18.12
Wire	
Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices
(In cents per pound, carlots)

Copper	
No. 1 heavy	9.25-10.00
Light	7.25- 8.00
Brass	
No. 1 composition	8.50- 9.00
Yellow brass castings	5.50- 6.00
Auto radiators	6.12½-6.62½
Red brass, borings & turnings	8.00- 8.50
Zinc	
Old	4.75- 5.00
New clippings	6.00- 6.50
Aluminum	
Clippings	9.75-10.25

Cast	8.75- 9.25
Pistons	8.50- 8.75
Sheet	8.75- 9.25
Lead	
Heavy	4.75- 5.25
Mixed babbitt	5.35- 5.50
Electrotype shells	5.00- 5.50
Stereotype, Linotype	6.00- 6.75
Tin and Alloys	
Block tin pipe	44.00-46.00
No. 1 pewter	32.00-36.00
Solder joints	7.75- 8.50
SECONDARY METALS	
Brass ingot, 85-5-5-5, l.c.l.	12.50
Standard No. 12 aluminum	14.50
MAGNESIUM	
(12 pound rod, 4 in. diam.)	
99.8% ingot, carlots	22.50
100 lb. to carlots	24.50
Extruded sticks, ¼ to 2 lb.	
Carlots	32.00
100 lb. to carlots	34.00

Nonferrous Metals . . .

New York—An official statement has been issued, denying widely circulated reports that "the supply of copper is adequate to meet all military and essential civilian requirements." H. O. King, director, WPB Copper Division, said that the supply of copper is not adequate and never will be while this war is on. Pointing out that several hundred million dollars are being spent on facilities for new projects to increase primary production and that supplies have been augmented by scrap collection and conservation programs, he concluded: "Because some of these efforts have been successful, and have resulted in a reduction of overall deficit is no reason for the relaxation of restrictions on use, or relaxation of our efforts to acquire every pound of copper wherever it is available."

Restrictions have been tightened on the use of tin, indicating that consumption in 1943 will be cut to about one-half that of 1941 and effecting a saving this year of 12,000 to 15,000 tons. The principal saving will be gained by reducing the tin content of solder from 30 per cent formerly permitted to 20 per cent.

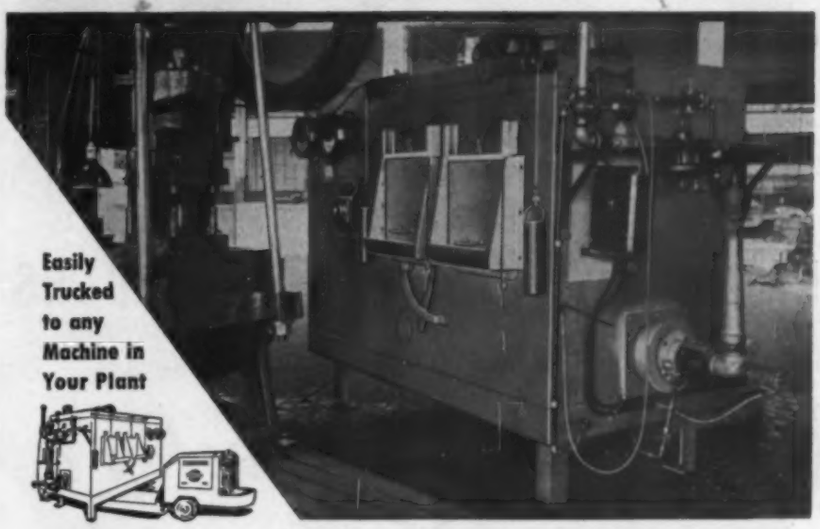
Zinc uses also will be cut further this year. While lead supplies are somewhat tighter, following a steady rise in reserves during 1942, metal consumers are urged to adopt lead if it will save more critical materials, especially zinc, copper and aluminum.

Warehouse . . .

Warehouse Prices, Page 105

While demand is more orderly and conservative, notably for most hot-rolled products, inquiry for cold-finished and alloy bars is unabated. Current shipments of both are moving direct to consumers as received and little new tonnage is added to inventories. At the close of last quarter considerable delayed tonnage reached distributors and inventories of hot-rolled steel, including black sheets, are somewhat better balanced. Supply of smaller hot-rolled bars is freer and quotas are being filled down to lower ratings; larger diameters of carbon bars are tight, also heavy flats, for which demand is strong. New arrivals of cold-finished, however, do not yet equal demand. Efforts to push bessemer for some products are hampered by difficulty in applying specifications.

FIVE REPEAT ORDERS IN 2 YEARS



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for Aluminum and Magnesium

Before you purchase heating equipment for forging, heat treating or aging aluminum or magnesium alloy parts, weigh these advantages of Morrison Engineered forced convection type furnaces.

Forced Convection Heating Furnaces
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Direct and Indirect Types
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All Fuels
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Melting Pots
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Galvanizing Kettles
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Special Equipment

1. Easily changed temperatures give adaptability to a wide range of work.
2. Close regulation within the critical ranges for correct heat treating.
3. No possibility of work overheating—less spoilage.
4. No employee hazard.
5. Lower investment, lower fuel cost, lower maintenance cost per unit of output.

Repeat orders, as illustrated by the furnace above used in forging aluminum airplane fittings, attest user satisfaction. The experience of our engineering staff is at your service to insure correct furnace equipment and application of forced convection heating to your heating problems. Write for additional information.

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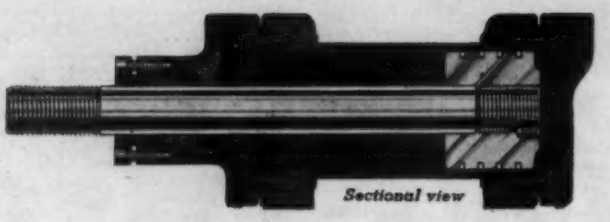
Sectional view

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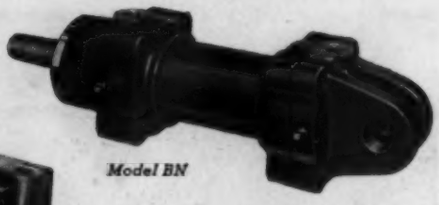
Write for Bulletin 35-S giving complete specifications


Model BN

Model EN

Other mountings available

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HANNIFIN HYDRAULIC CYLINDERS

A coil may develop a spring in a reptile, but in metal it takes coils of SCIENTECH *design to make a spring a hit.*

LEE SPRING COMPANY, INC.
30 MAIN STREET — BROOKLYN, N. Y.
LEE-BUILT TRADE MARK SPRINGS

Study Health of Workers for Means To Curb Absenteeism

(*Concluded from Page 25*)

program, studies of sickness absenteeism take priority," Dr. Selby asserted. "Absenteeism in General Motors' war plants is about 50 per cent greater than during peace-time automotive days, but the daily number of workers absent has been leveling off since September. The absentees who are off less than a week now amount to about 3 per cent, compared with 1.5 per cent in peace-time. Absences from sicknesses of more than a week are now about 1 per cent, representing little change from normal. Most of the short absences occur among new workers. They are receiving a great deal of attention from management and labor unions as well as the medical profession, but as an index of the effectiveness of the industrial health program they have little value."

Continuing, Dr. Selby pointed out that "about one-eighth of the employes were women, slightly less than 20,000 in number. Since then, their number has increased considerably and in some units they now comprise as high as 75 per cent of the workers, in others about 50 per cent. As the employment of women is increasing and industrial physicians have not had a great deal of experience with their health problems, it is appropriate that their sickness absence should be considered in relation to those of men.

Women's Absences Highest

"The over-all frequency rate of sickness absences in the women varied greatly in different communities and in different plants, from a low of 195.7 per 1000 to a high of 548.3, with an average for the entire female population of 320 per 1000. The average time lost per case varied from a low of 34 days to a high of 60 days, with an over-all average of 49 days per case.

"These rates become significant," the speaker declared, "when compared with the like rates of the male employe, which varied from a low of 38.1 per 1000 to a high of 144.5, with an average of 89.1 per 1000. The women's average rate was 320 per 1000. The time lost for male employes varied in different localities from a low of 25 days per case to a high of 57.8 days, with an average of 31.4 days per case. The average for women was 49 days per case.

"Reduced to a simple conclusion," Dr. Selby declared "these figures indicate that women are more apt to be absent because of sickness than men, and that they lose proportionately more time. If the specific causes for disability in women are analyzed and compared with the like causes in men, one outstanding

reason becomes apparent. Their disabilities from the respiratory infections are over twice as high as those of men —in fact, almost as high as those of men from all causes.

"The tuberculosis rate in women was twice as high in this study. Strangely enough, their pneumonia rate was one-half of that for men. Of course, the respiratory diseases are often epidemic and some localities show much higher rates than others. One notable exception was in Rochester, N. Y., where the rates were quite low. Even so, in this locality the rates for the respiratory diseases in the women were much higher than those in men.

"So, one of the important problems with respect to sickness absenteeism concerns the prevention and control of respiratory diseases in women. What can industry do about it?

"In an effort to obtain some information on this problem, the doctors who serve the employes of 104 manufacturing units were canvassed," Dr. Selby revealed. "A composite of their recommendations is interesting, though somewhat conventional. They were fairly unanimous in recommendations as to rest, exercise, diet, clothing, temperature, regular habits and avoidance of excesses, and isolation of cases. There is anything but unanimity with respect to the use of cold vaccines and vitamin capsules."

Drawing Upon Handicapped

Another problem which the conference considered was employing the physically handicapped. In discussing this, Dr. Fred H. Albee M.D., New York, declared we are facing a manpower shortage of 11,500,000 unless something radical is done to change the picture—to draw into industry the still untapped or inadequately tapped resources of available manpower in the women who as yet are not employed; older men scrapped during the depression; negroes; the so-called handicapped, who from a vocational point-of-view are frequently not handicapped at all, if only the slightly extra effort required is spent in choosing their proper placement.

"That," stated Dr. Albee, "is the only real difference between hiring a handicapped worker and hiring a so-called normal worker. A little more time, and sometimes a little more imagination, must be expended during the initial interviews to make sure that the work involved is within both the physical and mental scope of the handicapped. And later during the early days on the job, a little more supervision is sometimes necessary to guard against over-zealous effort, and to make sure that minor remedial inconveniences do not hamper his efficiency, for the average handicap would die rather than draw attention to his disability by seeking the correction of such an inconvenience himself.

"The greatest handicap the cripple faces in making good in today's economic world, is the handicap that years of prejudice has put in the minds of employers and fellow workers."

Dr. Albee pointed to the gratifying one-year experiment of Western Electric Co., Kearny, N. J., in 1929 in relaxing its physical requirements and employing 652 vocationally handicapped —482 males and 170 females—to work side by side and in direct competition with able-bodied workers. Almost 50 per cent of the handicapped hired had defective vision, 16 per cent suffered from hernia, and 19 per cent had a deformity or had lost an arm, hand, leg or foot.

Results were so good, declared Dr. Albee, that the company concluded "there is no real reason why people possessing certain vocational defects should not be employed by large industrial concerns. The results of our year's experience with the vocationally handicapped workers were sufficiently satisfactory to make their acceptance a part of the standard practice of our medical department."

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THE UNITED STATES GRAPHITE CO.
SAGINAW MICH.

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NEW BUSINESS

Plant Expansion, Construction and Enterprise, Government Inquiries, Sub-Contract Opportunities, Contracts Placed and Pending

SUB-CONTRACT OPPORTUNITIES

Data on subcontract work are issued by regional offices of the War Production Board. Contact either the office issuing the data or your nearest field office. Write, don't telephone, and mention key letters and numbers appearing before each item to assure prompt attention and avoid delay.

Philadelphia Office, Contract Distribution Branch, Production Division, WPB, Broad Street Station building, reports the following subcontract opportunities:

Keefer-59-2: Pennsylvania manufacturer desires subcontracting facilities for an adapter. Length ½-inch, diameter 2$\frac{1}{8}$-inch. Made from cold-rolled or hot-rolled steel, WD1115. Internal threading operations. Prime contractor needs 1000 pieces per day. Equipment, multi-spindle automatic screw machine. Prints at Philadelphia office.

Buescher-65-1: Ohio corporation requires 25,000 valve retainers. Equipment required, hand screw machine 1-inch spindle, drill press. Tolerance, .001-inch threads, 1 inch 20 NEF No. 3 fit. Dimensions 1 inch O.D. x .328-inch width. Material, stainless steel, to be furnished by the contractor. Drawings and specifications at Philadelphia office.

Buescher-61-1: An Ohio corporation requires 25,000 discharge valve seats. Material, stainless steel. Equipment, automatic screw machine 1-inch spindle, hand screw machine, drill press, flat lapping machine ½-inch diameter x $\frac{7}{32}$-inch seat. Dimensions, 1-inch O.D. x .328-inch width. Tolerance, .002. Material to be furnished by the contractor. Drawings and specifications at Philadelphia office.

Buescher-59-5: A government agency requires additional facilities for machining two sizes of six-throw aviation engine crankshafts. Production requirements start at 31 and 57 units per month, increasing progressively. Equipment, heavy-duty lathe 24-inch swing 10 feet center to center, crankshaft grinder, thread grinder, heavy-duty drill press, milling machine, balancing equipment, heat treating. Dimensions, overall lengths 37 and 48 inches, main bearings 2½ and 2¾ inches, crank throw 2½ inches and 2¾ inches. All forgings furnished.

Buescher-67-1: A government agency requires 2400 air flask forward heads, at rate of eight per day. Equipment required, engine lathe 24-inch swing; radial drill press, 3 feet; No. 4 milling machine; heat treating. Overall dimensions, 19.895 inches diameter. Depth of concavity, 3.594 inches. Tolerances, plus or minus .005, several plus or minus 002. Material, alloy steel, forgings will be furnished. Prints and specifications at Philadelphia office.

Buescher-67-2: A government agency requires 2400 air flask after heads, at rate of eight per day. Equipment required, engine lathe, 24-inch swing; 3-foot radial drill press; heat treating. Overall dimensions, 19.285 inches diameter, 3.75 inches depth of concavity. Tolerance, .005. Material, alloy steel forgings, to be furnished. Prints and specifications at Philadelphia office.

Buescher-67-3: A government agency requires 2400 water compartment heads, at rate of eight per day. Equipment required, engine lathe, 24-inch swing; 3-foot radial drill press, heat treating. Overall dimensions, 19.065 inches diameter, 3-inch depth of concavity. Tolerances, plus or minus .005, several plus or minus .002. Material, alloy steel, forgings to be furnished. Prints and specifications at Philadelphia office.

Buescher-1-1: A Pennsylvania manufacturer requires additional facilities for machining top cap and adjusting cap for 60,000-pound universal testing machine. Equipment required, horizontal boring machine 2 or 3-inch bar, planer 24 inches wide, drill press, slotter, No. 4 milling machine. Tolerance, plus or minus .002. Experience required, deep boring. Bore diameter 1¼-inch, length 33½ inches. Overall dimensions, 41¾ inches long x 9 inches wide x 7⅜ inches high. Material, cast steel. Castings will be furnished. Prints at Philadelphia office.

Detroit office, Contract Distribution Branch, Production Division, WPB, Boulevard building, is seeking contractors for the following:

Jobs No. 3967-3968: Subcontractors wanted for production of large quantities of screw machine parts. Two requirements, each for 40 million parts per month. Subcontractors must have facilities for production of minimum of 500,000 per month. Material is WO X1112 cold-finished steel rod, and is furnished, $\frac{7}{16}$-inch O.D. Samples at Detroit exhibit.

Jobs No. 3354-3364: Prime contractor seeks production facilities for 61 jobs. Material is furnished. Various sizes of hand and automatic screw machines required. Orders are for large quantities and subcontractors undoubtedly will obtain continuous contracts from this prime.

Job No. 3365: Machining operations on gear. SAE No. 3245 forgings, which are furnished. Facilities required, lathe, 9$\frac{7}{32}$-inch O.D. 3 operations; sensitive drill; bevel gear cutter; Universal or vertical mill; gear lapper; band or doall saw; heat treat; magnaflux. Priority AA-1. Order is for 1500 to 2000.

Job No. 3366: Machining operations on pinion. SAE No. 3245 forgings, which are furnished. Equipment, lathe, 8$\frac{1}{16}$-inch O.D.; sensitive drill; bevel gear cutter; gear lapper; universal or vertical mill; horizontal mill; heat treat; magnaflux. Order is for 1500 to 2000. Priority, AA-1.

Job No. 3460: Shaft takeoff retractable hook mechanism. SAE No. 1035 steel is furnished, ⅝-inch O.D. Equipment, hand screw machine ¼-inch collet, mill three operations, centerless grinder, cadmium plate. Order is for 2500 on AA-1 priority.

Job No. 3461: Jack screw. A16775 steel, ⅝-inch O.D., which is furnished. Equipment, hand screw machine two operations, sensitive drill, lead screw threader, nitride. Order is for 25,000 on AA-1 priority.

Job No. 3577: Bevel gear blank only, zinc die casting or brass. Prime will furnish brass rod, 1$\frac{5}{16}$-inch. Equipment, automatic screw machine, sensitive drill. Order is for 12,300 on AA-1 priority.

Jobs No. 3756-3771: Prime contractor seeks casting facilities on magnesium alloy. Sizes run from 2½ x 2½ x 2 inches to 9¾ x 5 x 3⅛ inches. Orders are for 900 on each job. Prime will consider subcontracting as many jobs as facilities can handle.

Job No. 3845: Base plug. Equipment, forging chucking machine, 3$\frac{7}{16}$-inch O.D.; screw machine, 3$\frac{5}{16}$-inch collet. Minimum order 100,000 pieces. Tolerance, plus or minus. .0015.

Job No. 3910: Sleeve coupling. Material furnished, 150,000 pieces. Equipment, automatic screw machine $\frac{11}{16}$-inch O.D., sensitive drill, cadmium plate. Tolerance, plus .003, minus .000.

Job No. 3911: Nut sleeve coupling. Material, steel, which is furnished. Number, 200,000 pieces. Equipment, automatic screw machine $\frac{7}{16}$-inch hex, tapper. Tolerance, plus .003, minus .000.

Job No. 3917: Lock nut, 100,000 pieces. Material, dural. Equipment, automatic screw machine ¾-inch hex, sensitive drill, tapper. Tolerance, plus .0094, minus .000.

Job No. 3926: 400,000 pieces. Material, duronze. Material furnished, $\frac{11}{16}$-inch round stock. Equipment, automatic screw machine $\frac{11}{16}$-inch O.D., sensitive drill. Tolerance, plus .003, minus .000.

Job No. 3951: Plug. 50,000 to 250,000 pieces. Material, cold-rolled steel. Equipment, automatic screw machine $\frac{11}{16}$-inch hex, 1⅛-inch long. Tolerance, plus .001.

Job No. 3953: Gear, 2500 to 5000 pieces. Material, steel. Equipment, automatic screw machine 4 inches O.D., lathe, mill, sensitive drill, internal grinder, lathe with offset pilot, surface grinder, helical hobber, tooth rounder. Dimensions, 2$\frac{1}{16}$ inches long. Tolerance, plus .00025.

Job No. 3973: Valve seat. 15,000 to 25,000, stainless steel. Equipment, automatic screw machine 1-inch O.D., sensitive drill, surface grinder, surface lapper. Tolerance, plus .001.

Job No. 3975: Valve tappet, chrome steel, 50,000 per month. Equipment, lathe, internal hone, external grinder, external lapper, automatic screw machine 1¼-inch O.D. Tolerance, plus .0005.

Job No. 4043: Washer retaining nut. 3000 per month. Material steel bar stock 1¼-inch diameter. Equipment, automatic screw machine 1¼-inch O.D., broach. heat treating, surface grinder. Tolerance, plus .0025.

Job No. 3615: Machine operations on 500 pieces per month. Bronze, material furnished. Equipment. turret lathe, sensitive drill, mill, tapper. thread hobber. Tolerance, plus .001.

Job No. 3967: Dowel, 500.000 per month. Material furnished, steel. Equipment, automatic screw machine, $\frac{7}{16}$-inch O.D. Tolerance, plus .000, minus .002.

Job No. 3968: Dowel, 500.000 per month. Material furnished, steel. Equipment, automatic screw machine, $\frac{7}{16}$-inch O.D. Tolerance, plus .000, minus, .002. Solid end.

Job No. 3974: Valve retainer. Stainless steel, 25,000 pieces. Equipment, automatic screw machine, 1-inch O.D.; sensitive drill, surface grinder. Tolerance, plus .0005.

Job No. 3989: Spanner nut, 50,000 pieces. Aluminum alloy. Equipment, automatic screw machine 2⅛-inch O.D., mill, sensitive drill. Tolerance, plus .0029.

Job No. 3993: Valve, stainless steel. Quantity, 20.000. Equipment, screw machines ¼-inch O.D., lathe, centerless grinder. Tolerance, plus .001.

Job No. 4048: Cam, 20,000 pieces. Material,

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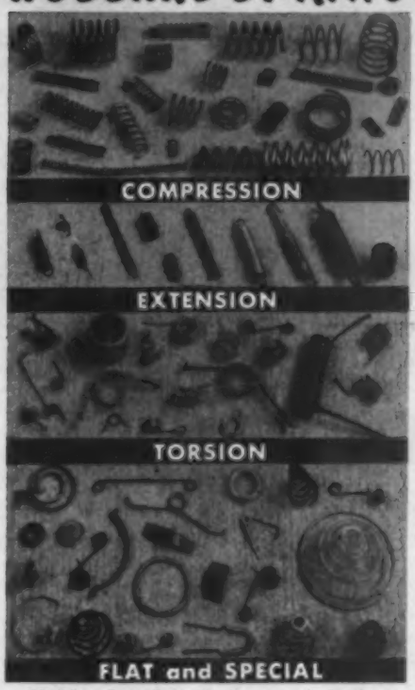

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CONSTRUCTION AND ENTERPRISE

OHIO

CLEVELAND—City of Cleveland, department of public utilities, George W. Hamlin, acting director, city hall, will take bids due noon Jan. 22, for three motor-driven boiler chemical proportioning pumps. Order No. 1485-42.

CLEVELAND—Master Hardchromers Inc. has been organized to do hard chrome plating. Incorporation papers have been filed through Attorney Milton C. Portmann, 600 Hickox building, statutory agent.

CLEVELAND—Clark Controller Co., Primus C. Clark, president, is adding to factory building at cost of $15,000. Plant is located at 1146 East 152nd street.

COSHOCTON, O.—Firestone Tire & Rubber Co., Akron, O., has begun remodeling of former Beach Enameling Co. plant here for production of war materials.

DAYTON, O.—Dayton Rubber Mfg. Co., 2345 Riverview avenue, Dayton, and six additional companies have organized Copolymer Corp., and will operate synthetic rubber plant in Louisiana. Defense Plant Corp. will own the plant.

DAYTON, O.—Defense Plant Corp. has awarded contract to Sheffield Construction Co., Dayton, to provide plant facilities in Ohio to cost in excess of $200,000.

NEW YORK

NEW YORK—Chicago Pneumatic Tool Co., 6 East Forty-fourth street, New York, has been allotted over $200,000 by the federal government for machinery and equipment to be installed in a plant in Ohio.

NEW JERSEY

RAHWAY, N. J.—Woodbridge Metallurgical & Chemical Corp., Leesville avenue, plans two-story metal chemical plant. Estimated cost $40,000.

PENNSYLVANIA

ALLENTOWN, PA.—Mack International Motor Truck Corp., 2647 East York street, will build plant addition.

EAST PITTSBURGH, PA.—Westinghouse Electric & Mfg. Co., George H. Parkman, director, building construction and maintenance department, Maloney building, Pittsburgh, is having plans prepared for extension to factory in Allegheny County. Defense Plant Corp. has authorized funds in excess of $600,000 for equipment.

ERIE, PA.—Keystone Brass Works, 926 West Twelfth street, plans addition for storage covering 2800 square feet to free space in factory for production. Additional machinery will be installed in space vacated. M. H. Rowley is vice president.

PHILADELPHIA—Rolle Casting Co., 2812-18 Bridge street, plans foundry.

PHILADELPHIA — Vibration Specialty Co., 1532-38 Winter street, will build machine shop.

MICHIGAN

DETROIT—John Lammert, 12244 Jane street, has been awarded contract for tool shop for Arrow Metal Products Co., 9325 East Forest street.

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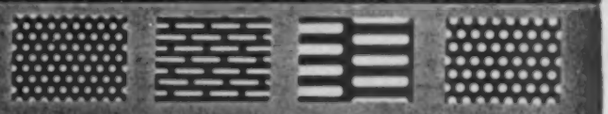

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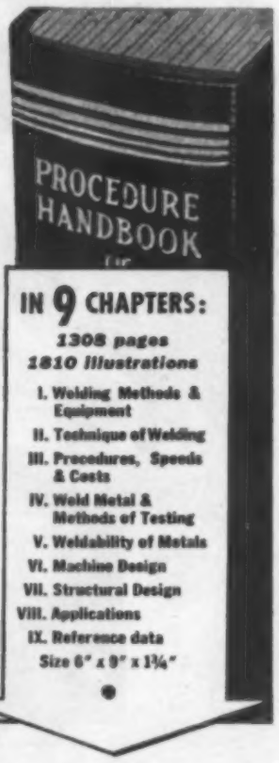

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429-S

DETROIT—Malcomson, Calder & Hammond Inc., 1217 Griswold, is completing plans for two additions to foundry of Aluminum Co. of America at 3311 Dunn road.

DETROIT—James A. Moynes & Co., 921 West Milwaukee, has contract for second story addition to factory at 3975 Christopher, Hamtramck, for Detroit Aluminum & Brass Co.

DETROIT—Campbell Construction Co., 3255 Goldner, Detroit, has awarded hardware contract in connection with erection of factory building in Dearborn for Hydraulic Machine Co., to Bullock Green Hardware Co.

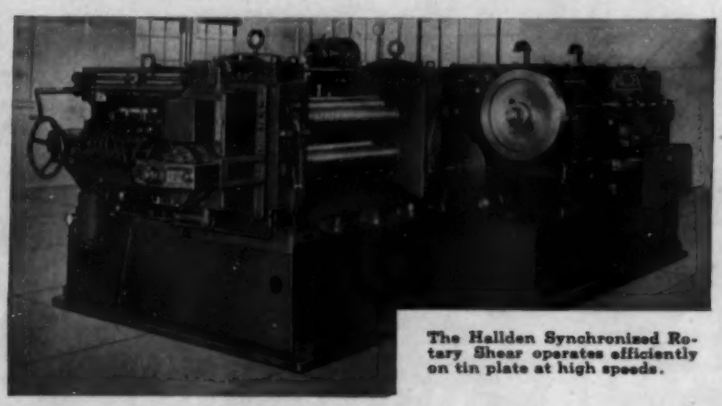
MONROE, MICH.—Private plans have been completed for addition and alterations to plant here formerly owned by Republic Steel Corp. and taken over by the Aluminum Co. of America. Estimated cost $3,000,000.

DETROIT—A. N. Wrixon, 15728 Fairfield, has contract for addition to building of Republic Gauge Co. at 2228 Fenkell.

ILLINOIS

CHICAGO—R. Lavin & Sons Inc., 3426 South Kedzie avenue, smelter and refiner of nonferrous metals, is building plant addition at cost of $150,000. Rissman & Hirschfeld, 65 East South Water street, Chicago, architects.

CHICAGO—Nicro-Steel Products Inc., 2701 North Clybourn avenue, sustained damage by fire at its plant Jan. 4.



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INDIANA

BEDFORD, IND.—M. F. Meyers Saw Co. is rebuilding plant at cost of over $40,000, including equipment.

DANVILLE, IND.—Indiana Farm Bureau Co-op. is rebuilding plant. Cost estimated over $40,000, including equipment.

FORT WAYNE, IND.—Studebaker Corp., Lincoln highway East, plans plant addition costing over $100,000. Giffels & Vallet, 1000 Marquette building, Detroit, engineers.

MARYLAND

FAIRFIELD, MD.—Haverstick & Borthwick Co., Schaff building, Philadelphia, has contract for acetylene plant here for Bethlehem-Fairfield Ship Yard.

CURTIS BAY, MD.—Charles H. Schwertner, 1505 Race street, Philadelphia, has contract for plant here for Air Reduction Sales Corp.. J. F. Fricker, chief engineer, New York. United Engineers & Constructors Inc., 1401 Arch street, Philadelphia, engineers.

GEORGIA

LOWNDES COUNTY, GA.—Brandon Electric Co., Deland, Fla., has contract for lighting system, costing under $50,000. United States engineer office, Jacksonville, Fla., in charge.

NORTH CAROLINA

WILMINGTON, N. C.—Defense Plant Corp. has awarded contract to Broadfoot Iron Works, Wilmington, to provide equipment for plant in North Carolina.

FLORIDA

HAVANA, FLA.—Havana Canning Co. will convert present facilities for dehydrating plant for fruit and vegetables.

VOLUSIA COUNTY, FLA.—J. R. Hime Electric Co., Palm Beach, Fla., has contract for electric distribution system, costing under $50,000. United States Engineer office, Jacksonville, Fla., in charge.

VIRGINIA

CRIMORA, VA.—Dominion Manganese Co. leased and will develop Old Dominion and Crimora manganese mine properties here. H. A. Brassert & Co., mining and consulting engineers, New York, will be operating engineers.

MISSOURI

ST. LOUIS—Murch Jarvis Co., 705 Olive street, general contractor for factory additions at 4171 Bingham avenue for Alligator Co. has begun work on project.

ST. LOUIS—Wrought Iron Range Co., 5661 Natural Bridge avenue, has awarded contract to John H. Crosby, 6569 Odell avenue, for one-story furnace room.

ARKANSAS

PONCA, ARK.—A. E. Seabass and Carl Modesitt, Denver, have started work on ore concentrating mill here. Cleve Byrd, Harrison, Ark., mining engineer in charge.

NEVADA

WINNEMUCCA, NEV.—United Strategic Metal Co., B. H. Jackson, trustee, Winnemucca, plans tungsten mill. William M. McCartney, Box 309, Winnemucca, engineer.

CALIFORNIA

LOS ANGELES—Addition to factory of Cadmium-Nickel Plating Co. is being erected at 1400 Long Beach avenue, to cost $7000.

LOS ANGELES—Acme Iron Fabricators Inc. has been organized with capital of $50,000, by Lloyd and Byrtene V. Reisor and George Prizer, all of Los Angeles. Corporation is represented by Nixon A. Lange, 7217 Long Beach boulevard.

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WASHINGTON

TACOMA, WASH.—Additional facilities in Washington for Coast Carbons Inc. have been authorized by Defense Plant Corp., making a total commitment of $200,000.

CANADA

KITCHENER, ONT.—Onward Mfg. Co. Ltd., 1027 King street East, has received bids and will let contracts soon for plant addition to cost about $15,000. Equipment to be installed includes four power punch presses, metal cutting band saw, milling, filing machine and shaper.

KITCHENER, ONT.—Dominion Electrohome Industries Ltd., 39 Edward street, has given general contract to Ball Bros. Ltd., 49 King street East, for addition to No. 2 plant on Victoria street, North, to cost about $15,000.

LONDON, ONT.—Acme Machine Co., 672 Bathurst street East, has called bids for plant addition to cost about $15,000, with equipment.

MALTON, ONT.—Victory Aircraft Ltd., N. Wagner, chief engineer, has given contract to W. H. Yates Construction Co. Ltd., 400 Wellington street North, Hamilton, for further addition to plant here to cost about $10,000, equipment extra.

NEW TORONTO, ONT.—Goodyear Tire & Rubber Co. of Canada Ltd., 980 Lake Shore road, is considering plans for plant addition and installation of equipment, to cost about $300,000. D. C. Carlisle, comptroller.

PETERBORO, ONT.—Canadian General Electric Co. Ltd., 212 King street, West, Toronto, has given general contract to A. W. Robertson Ltd., 57 Bloor street West, Toronto, and work will start immediately on plant addition here to cost about $20,000.

PORQUOIS JUNCTION, ONT.—Harlan Nickel Mines Ltd., 1809 Royal Bank building, Toronto, plans to start work soon on mine buildings, plant and equipment, estimated to cost about $25,000. Work will include blacksmith shop, power house, shaft house, etc.

PORT COLBORNE, ONT.—Canadian Furnace Co. Ltd., 5 Lake Shore road, has plans for plant addition here to cost about $25,000, with equipment.

ST. CATHARINES, ONT.—McKinnon Industries Ltd., Ontario street, has plans for plant addition and installation of electric furnace equipment, to cost about $25,000.

ST. CATHARINES, ONT.—Thompson Products Ltd., 37 Louth street East, has given general contract to Edgar Moir, 210 Geneva street, for further plant addition to cost about $25,000. A. E. Nicholson, 46 Queen street, architect. Newman Bros. Ltd., 127 St. Paul street, has contract from same owner, for inspection electrical maintenance room.

TORONTO, ONT.—Shell Oil Co. of Canada Ltd., 25 Adelaide street East, has plans and will call bids soon for plant addition and installation of equipment, to cost about $12,000.

TORONTO, ONT.—Canadian Pacific Railway Co., V. A. G. Day, divisional engineer, Union Station, has awarded general contract to Wells & Gray Ltd., 627 Confederation Life building, and excavation work is proceeding for craneway to cost about $12,000 at West Toronto shops.

TORONTO, ONT. — Aluminum Goods Ltd., 4006 Dundas street West, has given general contract to A. P. Vokes, 41 Glenwood avenue, for plant addition to cost about $15,000, with equipment.

TORONTO, ONT.—Canadian Acme Screw & Gear Ltd., 207 Weston road, has plans for plant addition and installation of equipment, to cost about $30,000.

WINDSOR, ONT.—Ford Motor Co. of Canada Ltd., Sandwich street East, has given contract to Woodall Bros., 1922 Wyandotte street East, for plant addition to cost about $72,000, and contract to Dinsmore-McIntyre Ltd., 903 Security building, for substation to cost about $189,000, with equipment.

JONQUIERE, QUE.—Canadian National Railways, 360 McGill street, Montreal, is completing arrangements for rebuilding car shops here, to cost about $100,000, including equipment.

MONTREAL, QUE.—Department of Munitions and Supply, Ottawa, H. H. Turnbull, secretary, in association with company whose name is withheld, has given contract to A. F. Byers Construction Co. Ltd., 1226 University street, for addition to aircraft plant here to cost about $90,000. T. Pringle & Sons Ltd., 485 McGill street, designing engineer.

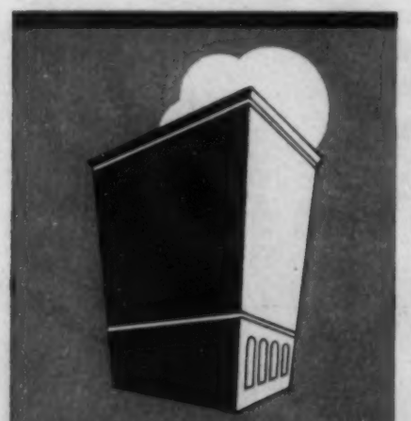
MONTREAL, QUE.—Canadian Car & Foundry Co. Ltd., 621 Craig street West, has taken bids through Spence & Burge, architects, 2063 Union avenue, for addition to Turcot Propeller Division, Lachine canal, to cost about $75,000, with equipment.

MONTREAL, QUE.—Ayerst, McKenna & Harrison Ltd., 485 McGill street, is having plans prepared and will call bids about the end of January for research laboratories on St. Mathieu street, to cost with equipment, about $250,000. H. P. McPherson is secretary.

MONTREAL, QUE.—Dominion Bridge Co. Ltd., Lachine, is having plans prepared and will call bids this month for addition and crane runway to cost about $20,000. A three-ton electric overhead travelling crane and other equipment will be installed. Archibald & Ilsley, 1440 St. Catharine street West, architects.

GRANVILLE ISLAND, B. C.—Overseas Wood Products Ltd., 72 Pacific building, Vancouver, has plans for reconstruction of sawmill here to cost, with equipment, about $65,000.

VANCOUVER, B. C.—Canadian Sumner Iron Works Ltd., 2550 Central Arterial highway, has plans for plant addition to cost about $30,000, with equipment.



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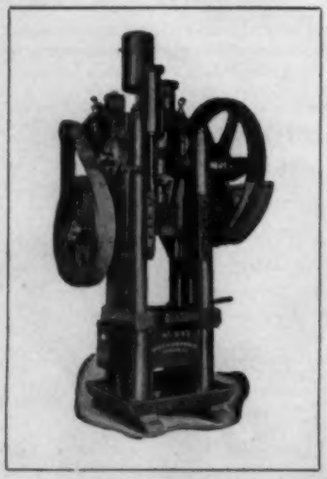

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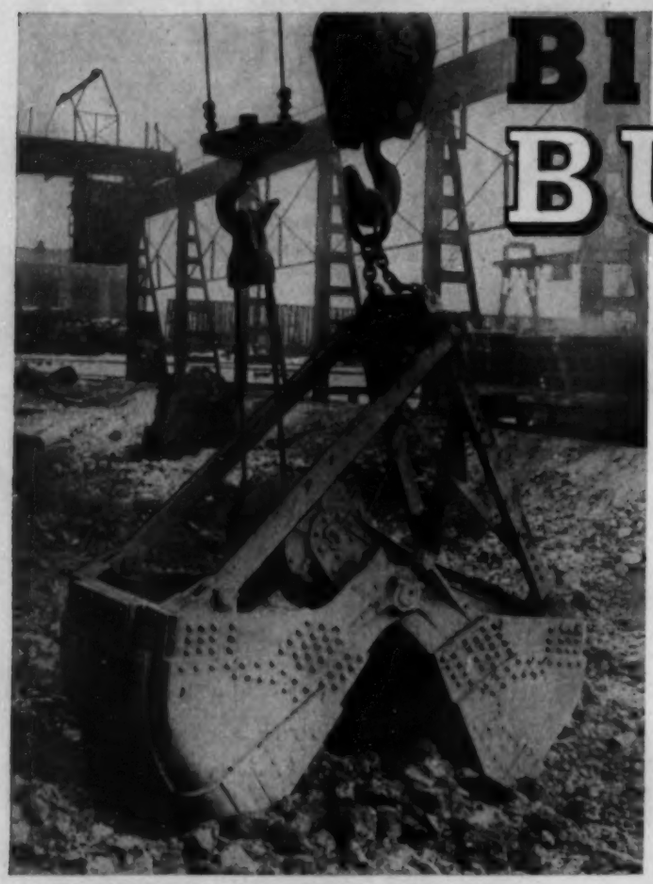

Blaw-Knox Two Line "Hook-on" Bucket, for two hook block operation. This is a heavy duty type for operating in the slag drop. This particular bucket is rated 3 cu. yd. capacity, weighs 19,300 lbs. The operating clearance, reeved two parts, is 16 ft. 3 in.

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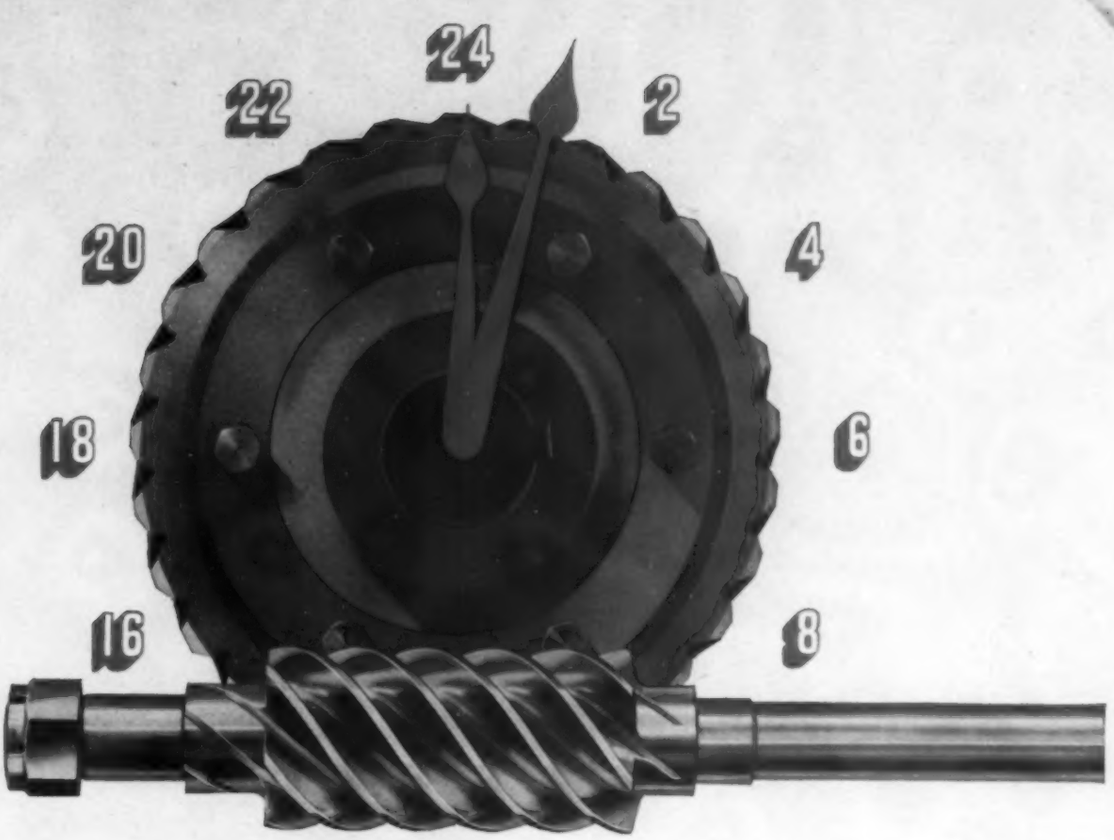

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